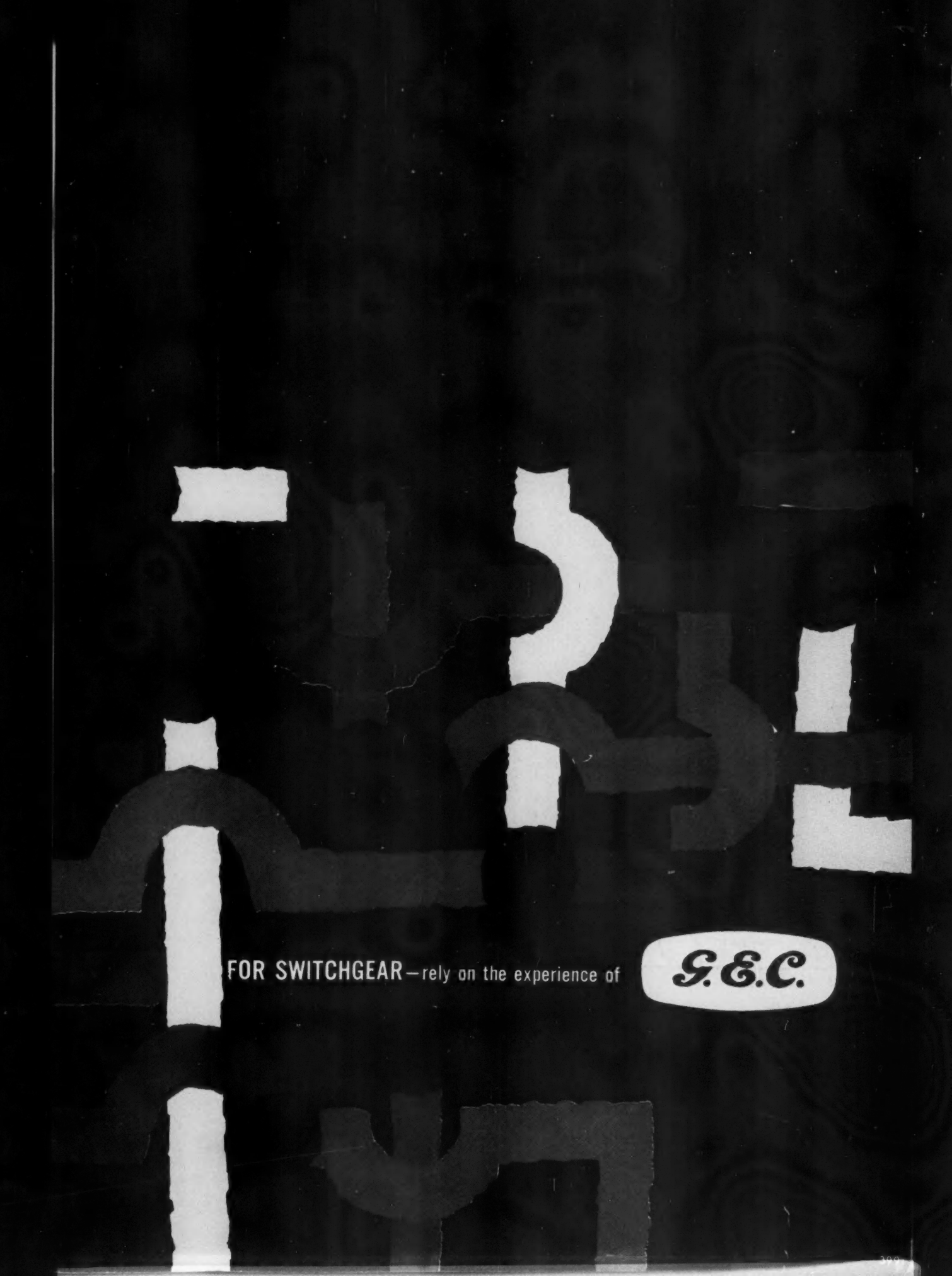

FOR SWITCHGEAR—rely on the experience of
G.E.C.

More advantages

A TYPE APPLICABLE TO EVERY INDUSTRY

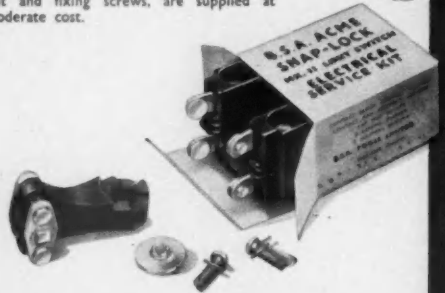
in Mark II SNAP-LOCK heavy duty limit switches

WATER
OIL
AND
DUSTPROOF
OR
FLAMEPROOF
VERSIONS

Now

TWO ONLY REPLACEABLE UNITS IN THE ELECTRICAL SIDE

There are only two assemblies in the electrical side of B.S.A. ACME SNAP-LOCK Mk. II limit switches: a moulded one-piece contact block and the contact arm. Interchangeable on all models they are designed for easy replacement. Service kits comprising these items, complete with holding nut and fixing screws, are supplied at moderate cost.



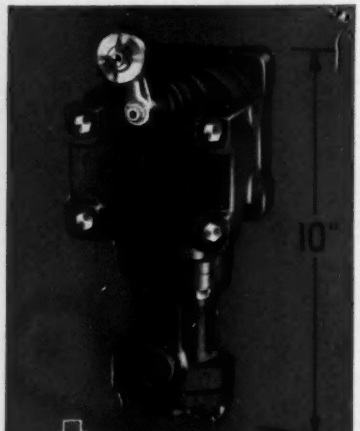
B.S.A. Acme Snap-Lock heavy duty limit switches have an established reputation for reliability under the most arduous conditions. Recently introduced Mark II versions retain proved features of their forerunners but incorporate refinements in design and manufacture principally to simplify servicing, provide complete interchangeability of assemblies, increase electrical resistance to earth and ensure lasting efficient sealing. Please ask for the Mark II catalogue.

STANDARD

WATER, OIL & DUST PROOF

Single pole, double break, double throw, operates with either circuit normally open with other closed, or maintaining in either position, or available with central (neutral) position and/or centre connection. Heavy aluminium die-cast case. Water, oil and dust proof. Conduit ¾ in. B.S., or No. 3 Admiralty Pattern Cable gland entry. Two-screw side mounting or backplate mounting in two styles, or Tandem style (back to back mounting). Operating lever position adjustable in 7.5 deg. increments through 82.5 deg. either way from normal.

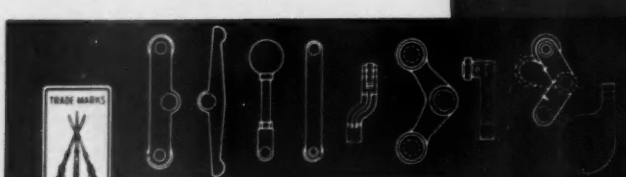
STANDARD NEUTRAL POSITION OR CENTRE CONNECTION



FLP FLAMEPROOF

SINGLE OR DOUBLE ENTRY

Buxton certificates No. 3574 (Group I) No. 3575 (Groups II and III gases). Meehanite iron castings. Self wiping solid silver contacts, interchangeable plugs and sockets. Internal mechanism removable as a unit for servicing. **Single SWA cable entry (standard); double entry if required.** *Operating lever position adjustable in 7.5 deg. increments through 360 degs. Single pole, double break, having one normally closed and one normally open circuit. Available with central (Neutral) position and/or centre connection.*



A few examples from the range of more than 30 styles (over 150 sizes) of interchangeable operating levers. List on request.

TRADE MARKS
B.S.A. TOOLS DIVISION

Made in England under Licence by B.S.A. TOOLS LIMITED, BIRMINGHAM 33

Sole Agents U.K.

BURTON GRIFFITHS & COMPANY LIMITED

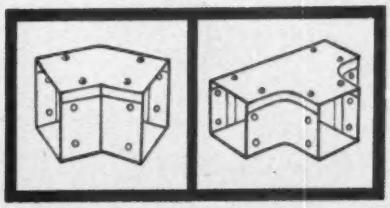
SNAP-LOCK DEPT., MONTGOMERY STREET, BIRMINGHAM, 11

PHONE: VICTORIA 2351

B.S.A. SNAP-LOCK ACME

463

Power Centre trunking fittings. Precision made Speeds the job of installation. Layout extension or alteration made easy Shown right, H.E.T. Half Normal Bend and Normal Tee.



it's what you don't see that makes Power Centre Trunking so durable

ELECTRICAL DIVISION

POWER CENTRE

Poor J.B., he's been hanging around for days. Never said a word to anyone. Doc says it's trunking problems. "He needs a tonic", he said. So Doc, who gets to the bottom of everyone's troubles, prescribed Power Centre, the people who make jig made trunking that's got a hidden coating of zinc which ensures long lasting protection. This P.C. treatment has re-vitalised J.B. Already, he's feeling on top of the world with the satisfaction of knowing he can cut installation costs by as much as 33⅓%.
J.B. is a different person now, thanks to Power Centre. What's more, he fully recommends a dose of P.C. to anyone who's suffering from trunking problems.

If you're in this unnecessary predicament, take the first step to satisfaction by sending for P.C.'s fully descriptive literature.

Address to:
THE POWER CENTRE CO., LTD.
P.O. BOX 18, LLOYD STREET,
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Stocks in all Simplex Branches throughout the country.

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Contact Conductivity

WITH

ELECTROLUBE

BRAND

THE UNIQUE ELECTRICAL AND MECHANICAL LUBRICANT

- ✳ ANTI-TRACKING
- ✳ NON DRYING
- ✳ CHEMICALLY INERT
- ✳ LOW TOXICITY
- ✳ INCREASED CONDUCTIVITY
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- ✳ WATER REPELLENT
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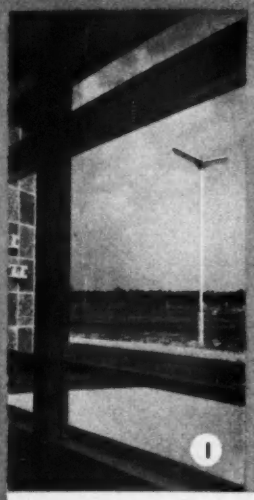
- ✳ TARNISH INHIBITOR
- ✳ LOOSENS TARNISH

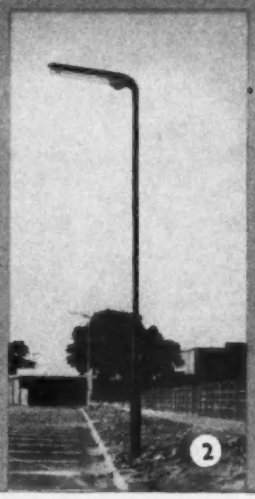
AVAILABLE FROM YOUR WHOLESALER

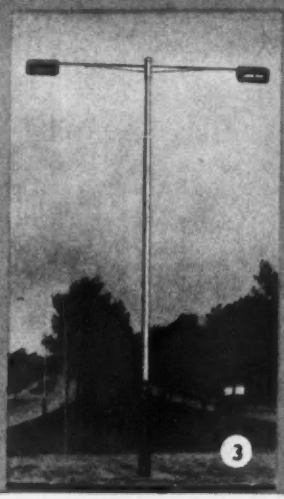
Write for 20 page TECHNICAL BOOKLET to:

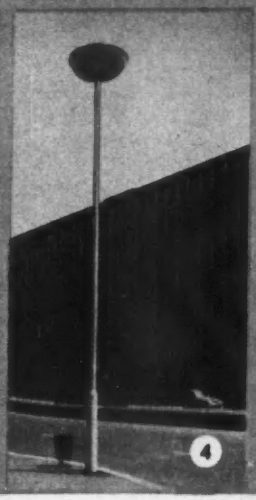
ELECTROLUBE LIMITED

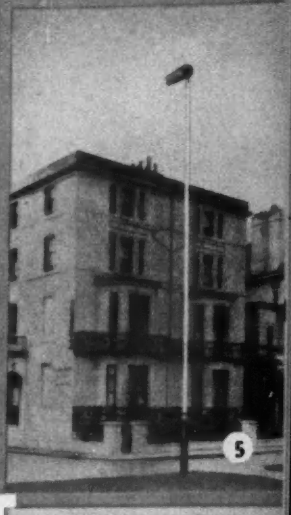
16 BERKELEY STREET, LONDON W.1











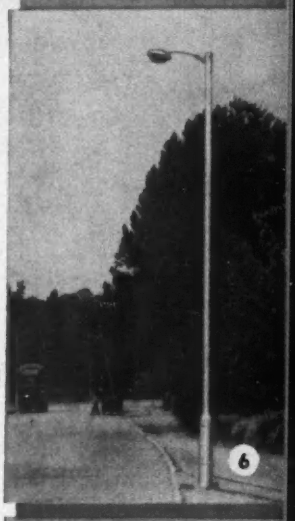
Lighting for safety—with
S & L TUBULAR STEEL LIGHTING COLUMNS

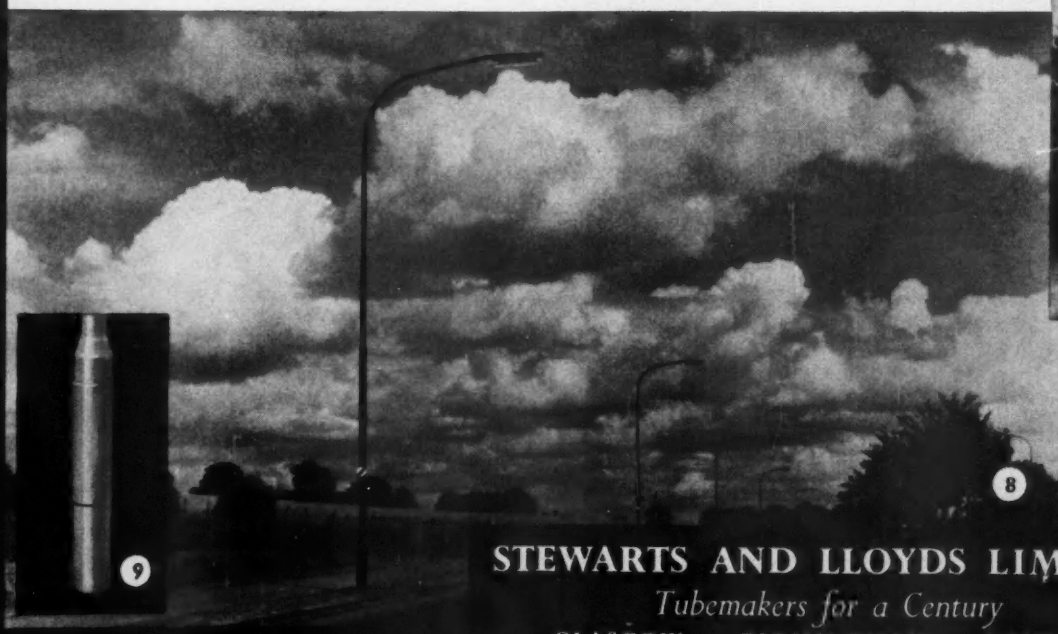
Efficient lighting is now accepted as one of the major steps towards greater road safety. City or Borough Engineers and Surveyors investigating lighting schemes are invited to call on the services of the S & L design staff whose experience helps them to achieve effective street lighting adaptable to environment and economical in maintenance and operation. Mounting heights of S & L columns (manufactured to B.S. 1840-1960) range from 13 ft. to 40 ft.; varying outreach permits offsetting from pavement edge.

A few of the many S & L lighting schemes and new designs are shown here.

1. Type Gb. 965 B, 25 ft. mounting height.
2. Type Gb. 965 A, 25 ft. mounting height. Columns shown in 1 and 2 are installed adjacent to the Borough of Shrewsbury's livestock market.
3. Type Gb. 591 double bracket arm, 25 ft. mounting height.
4. Type Gb. 1033, 30 ft. mounting height. Supplied to the Corporation of Birmingham.
5. Type LC 301, 35 ft. mounting height. Displayed at the 1960 A.P.L.E. Exhibition, Folkestone.
6. Type Gb. 825, 25 ft. mounting height. Installed at Merstham by the Reigate Corporation.
7. Type Gb. 837/1, 15 ft. mounting height. Displayed at the 1960 A.P.L.E. Exhibition, Folkestone.
8. Type Gb. 995, 35 ft. mounting height. Supplied to the Lanark County Council. (The first installation in the U.K. using this type of column.)
9. The new plain 'S & L slip-in' door supplied for all standard lighting columns.

Our catalogue, with illustrations and section drawings, is available on request.





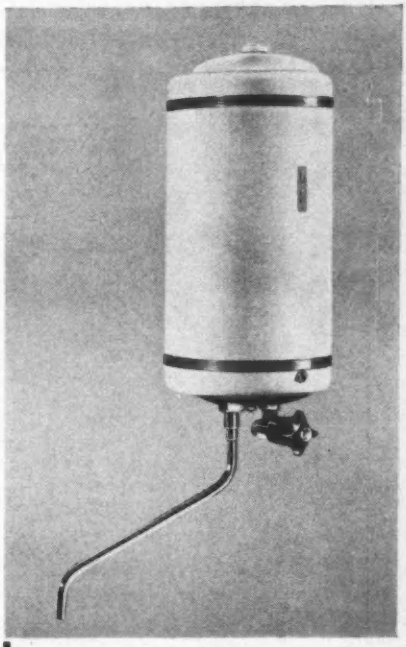
S&L

STEWARTS AND LLOYDS LIMITED

Tubemakers for a Century

GLASGOW · BIRMINGHAM · LONDON

The new one-gallon water heater



HERE IS MAGIFLOW — the latest newcomer to Berry's famous 'Magi' range of electrical appliances.

Trim good looks and top efficiency make the Magiflow the water heater more and more people are going to ask for. Its sleek design takes up less than a square foot of wall space — yet Magiflow can supply more than enough piping hot water for any average family, thanks to its exceptionally quick recovery.

First class insulation and "magic eye" thermostatic control cut running costs to the absolute minimum. Check all the Magiflow's features and see why *this* is the water heater you should recommend.

Capacity:	1 gallon
Voltage:	200-250 V
Loading:	2 kW at 250 V. 1·5 kW at 200 V.
Size:	17″ high 7½″ wide 8″ projection
Finish:	White or cream Chromium fittings Black, easy-to-clean, toughened plastic tap

The Magiflow complies with B.B.S. 843 and 1010

PRICE: £10.16.6 plus P.T. £2.2.3 =

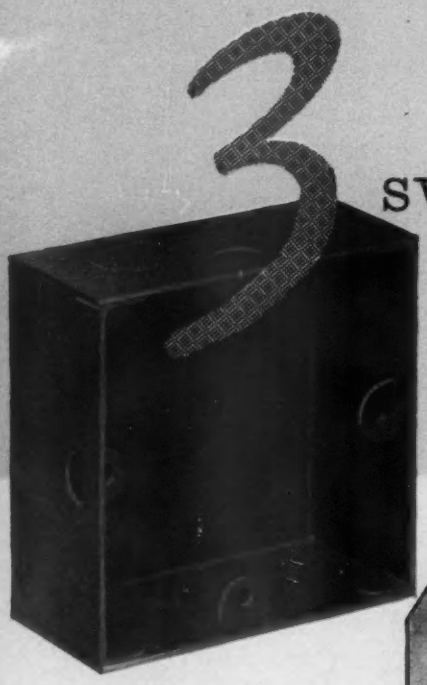
£12. 18. 9

Berry's

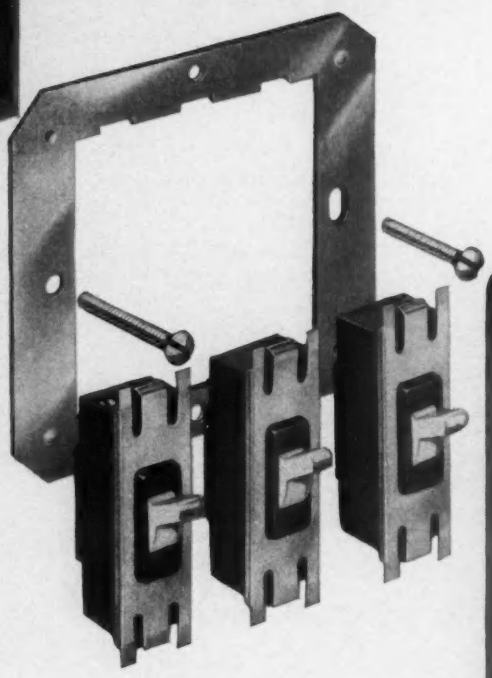
BERRY'S ELECTRIC MAGICOAL LTD

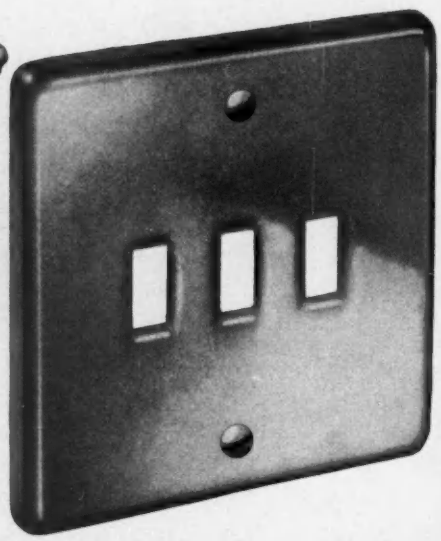
Water Heater Division · Touchbutton House · Newman Street · London W.1 · Tel: Museum 6800

NOW



you can put up to 3 switches in a BS 1299 1-GANG BOX with 'MUTAC CLIPPER' switch assemblies

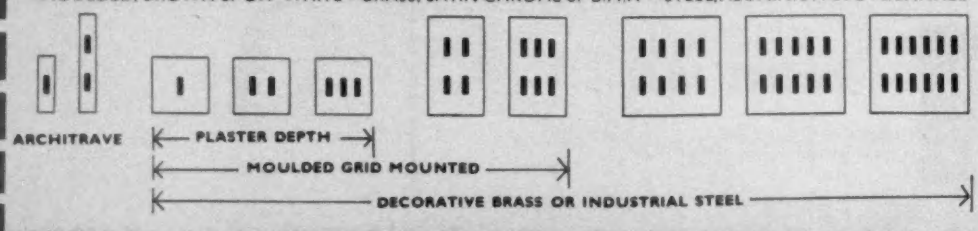




Three into one does go, safely, compactly and swiftly, when you use 'Mutac Clipper' switch assemblies and a standard B.S.1299 box. And now all the proven 'Mutac Clipper' advantages—simplified installation, time saved, reduced costs, are available in types and sizes to cover every normal switching requirement. The chart below gives full details and a useful switch selector, available freely on request, makes ordering simple too.

44 DIFFERENT SWITCH PLATES BASED ON 26 ASSEMBLIES

MOULDED, BROWN or OFF-WHITE – BRASS, SATIN CHROME or B.M.A – STEEL, ALUMINIUM STOVE ENAMEL



INTERCHANGEABLE UNITS

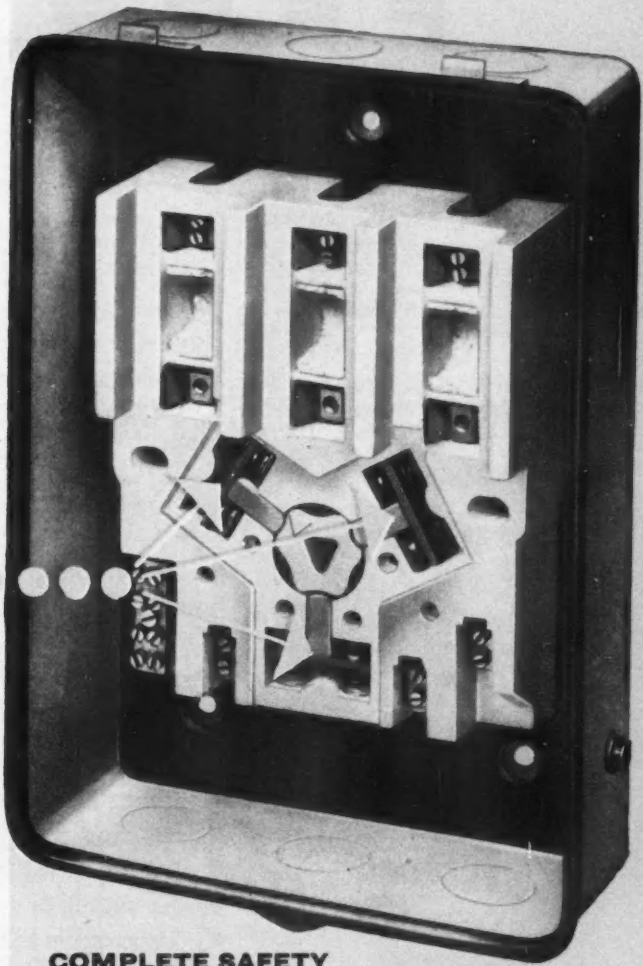
SWITCHES
5 amp 1 way S.P.
15 amp 1 way S.P.
5 amp 1 way D.P.
5 amp 2 way S.P.
5 amp 2 way & Off
5 amp intermediate
5 amp 1 way secret
5 amp 2 way secret
BELL PUSH
NEON INDICATOR

G.E.C. INSTALLATION

THE GENERAL ELECTRIC CO. LTD., KINGSWAY, LONDON, WC2

'HIDUTAC'
switchfuses

tested
to 110,000
operations at
1½ times full load
on tungsten
lighting load
and still
fit for duty



SINGLE POLE & NEUTRAL
DOUBLE POLE
TRIPLE POLE
TRIPLE POLE & NEUTRAL

15-30 or 60 amp. 440 volts a.c. with rewireable or H.R.C. fuses.

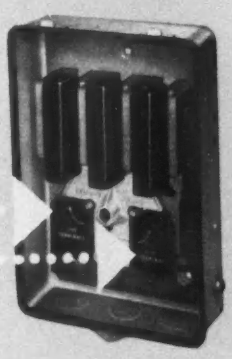
'Hidutac' by G.E.C.—switchgear of advanced design combining high performance, complete safety and good looks. High breaking capacity makes 'Hidutac' switchgear ideally suitable for motor control, transformer and discharge lighting control.

Categories of Duty:
H.R.C. fuses (all ratings) AC 4 of BS 88 (33000 amps.)

Rewireable fuses 15 & 30 amp. ratings. S2A of BS 3036 (2000 amps.) Rewireable fuses 60 amp. rating. S4A of BS 3036 (4000 amps.)

COMPLETE SAFETY

For complete safety all INTERNAL moving parts are totally enclosed. Switch element for each phase is an individual enclosure to give maximum protection against flashover. Incoming terminals are screened by shields bearing the words "Live Terminals". Full interlock is provided between cover and switch mechanism.



EQUIPMENT GROUP

INSTALLATION EQUIPMENT GROUP HEADQUARTERS, FOUR ASHES, WOLVERHAMPTON

If accurate voltage control is your problem

FERRANTI

can help you

For over 30 years, the Ferranti Moving Coil Voltage Regulator has been applied to a wide variety of industrial processes in all parts of the World where smooth accurate control of voltage is essential.
The Regulator can readily be arranged to control the voltage of any particular industrial or laboratory process from straightforward A.C. and D.C. voltage and current references to the more complex problems involving such items as temperature or pressure sensitive devices, servo mechanisms, etc.
Advice on voltage control problems, will be given by Ferranti engineers on request.

Outstanding Features:

- Fully automatic operation
- Easily installed
- Robust mechanical construction
- Requires negligible maintenance
- Avoids oil carbonisation
- No sliding or rolling contacts
- Thoroughly reliable
- Infinitely smooth voltage control

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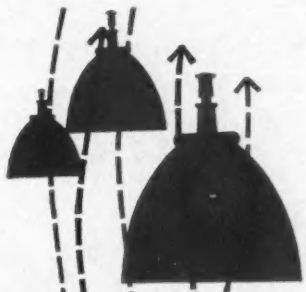


new self-cleaning high bay lighting

The new Simplex Airflo fitting gives you increased efficiency plus greater adaptability. It is pleasantly contoured; weighs only 10 lbs complete with Simplex Discon* device fitted for extra ease of installation and maintenance.

The Airflo's aluminium reflector is cleaned by a unique high velocity dust expulsion ensuring efficient lighting —a priority consideration in modern industry. Available in two sizes for use with 250W-1000W MBF/U lamps. Send for leaflet for details.

Airflo for Fords! In the Machine and Tool shop at Dagenham, fittings were mounted at a spacing height ratio of 1:1 giving an illumination value of 25.5 lumens per sq. ft.

CALCULATED REFLECTION THROWS A GREAT DEAL OF LIGHT ON INDUSTRY

'AirFlo

*The Simplex Discon device allows instant connection to or disconnection from the conduit system without disturbing wiring or lampholder. Leaflet L.2192 gives full details.

Simplex

ELECTRICAL DIVISION

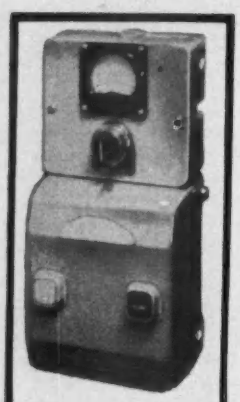
SIMPLEX ELECTRIC COMPANY LIMITED
CREDA WORKS BLYTHE BRIDGE, STOKE-ON-TRENT, STAFFS.
Branches throughout Britain and Agents throughout the World.

L.6.

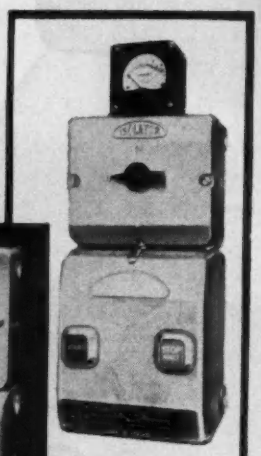
for squirrel-cage motors up to 7½h.p. 380V...

BTH KEEPS STARTERS IN STOCK

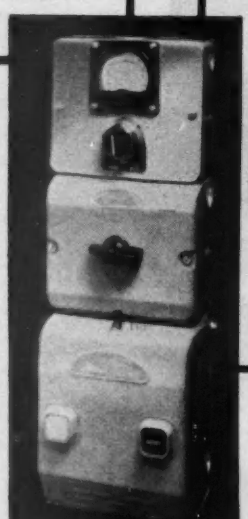
in both simple and comprehensive forms



Routine maintenance, or full servicing, with a screwdriver alone in a matter of minutes

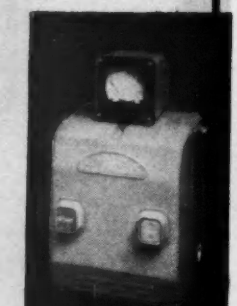


Easy wiring with ample cable knockouts top and bottom



Can be stocked, and built-up as required, by quantity users

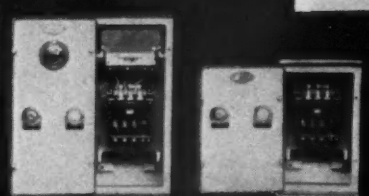
This die-cast alloy simple starter is in stock at our Chester Works in many commonly required arrangements. It occupies less than one-tenth of one cubic foot



Both its lift-out mechanism and its case are firmly mounted with the minimum of fixing screws

Vertical, dust safe contacts and small-mass moving parts for great electrical and mechanical service life

Drop-down lid gives immediate access to interior



The sheet steel comprehensive model is rubber gasketed for dust and damp protection *as standard.* It is in stock at our Chester Works in all the commonly required arrangements, including reversing

Write for details of these quick-delivery across-the-line starters

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Area Offices: BIRMINGHAM · BRISTOL · BOURNEMOUTH · CARDIFF · EAST ANGLIA · GLASGOW LEEDS · LONDON · MANCHESTER · NEWCASTLE · NOTTINGHAM · SHEFFIELD · BELFAST

Works at: **CHESTER & BEDFORD**

Makers of Britain's widest range of electrical control and associated equipment.

BTH

Metal Industries Group

BI/48

REGD. TRADE MARKS: F.B.C., FAFNIR

INSIST ON GENUINE F·B·C SPARES

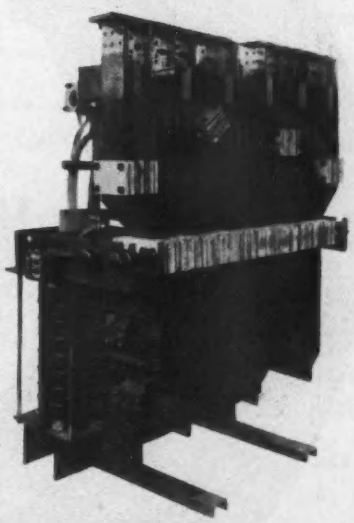
Deep-groove ball-bearings with or without seals; extra-high-speed bearings, extra quiet bearings and parallel-roller bearings.

BALL AND PARALLEL-ROLLER BEARINGS

FAFNIR BEARING COMPANY LTD., WOLVERHAMPTON. *Telephone:* Wolverhampton 26101-10

POWER FOR INDUSTRY

This oil-immersed rectifier transformer (with interphase reactor) provides an output of over 4,000A at voltages from 15 to 29V from a 10kV 50 cps 3-phase input. If YOU have a supply problem involving heavy current equipment, Gresham can place a lot of experience at your disposal.



GRESHAM TRANSFORMERS LTD
POWER DIVISION
TWICKENHAM ROAD HANWORTH MIDDLESEX
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WHY FOIL FOR COILS?
STABLE PRICE OF ALUMINIUM
STRUCTURAL STABILITY
MOISTURE-PROOF
IMMUNITY TO INTERNAL SHORTING
RAPID HEAT DISSIPATION
USUALLY CHEAPER

VENESTA FOILS LTD

Put foil's top team to work for you!

Aluminium foil electrical coils, of almost any length and width, are an important new development in the electrical industry. Foil, with a thermo-setting insulating coating on one side, is wound into a reel like a roll of adhesive tape. The coils are then stoved to set the insulation. The result is a structurally stable block with no need for cheeks or formers, and immune to moisture and corrosion. Extreme accuracy—guaranteed to ± 0.002 in.—can be obtained by machining the coils on a lathe, while mild etching eliminates short circuiting. The difference in conductivity between copper wire and aluminium foil is offset by the better space factor of the rectangular section. There are no voids between the turns so heat diffuses evenly from turn to turn and from the middle to the ends, abolishing 'hot spots': the coils are thus tolerant of high temperatures and are easily cooled by fan or water. Low P.D. between adjacent turns makes foil coils inherently safe from internal shorting.

WE OFFER YOU full technical advice and finished coils, or coated foil for your own winding

WRITE OR 'PHONE FOR ONE OF OUR STAFF TO VISIT YOU.
VENESTA FOILS LTD., THORN HOUSE, UPPER ST. MARTIN'S LANE, LONDON W.C.2. TEL: TEMPLE BAR 4399

NEWS SHEET

Budget proposal analysis suggests cost increases for supply industry. Fuel oil duty will cost industry or its suppliers £10 million/year; full 4s/head payroll tax would cost £2·1 million/year. (661)

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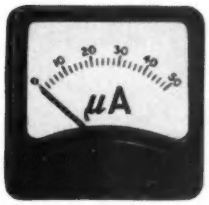

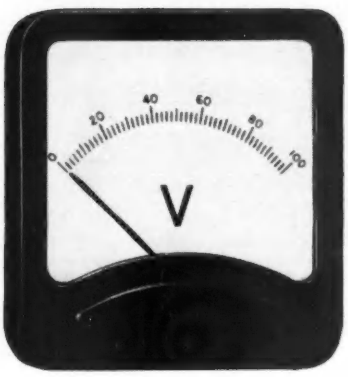

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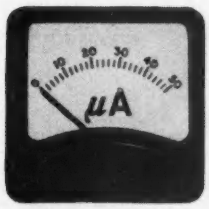

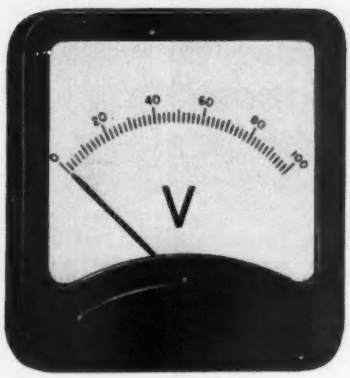

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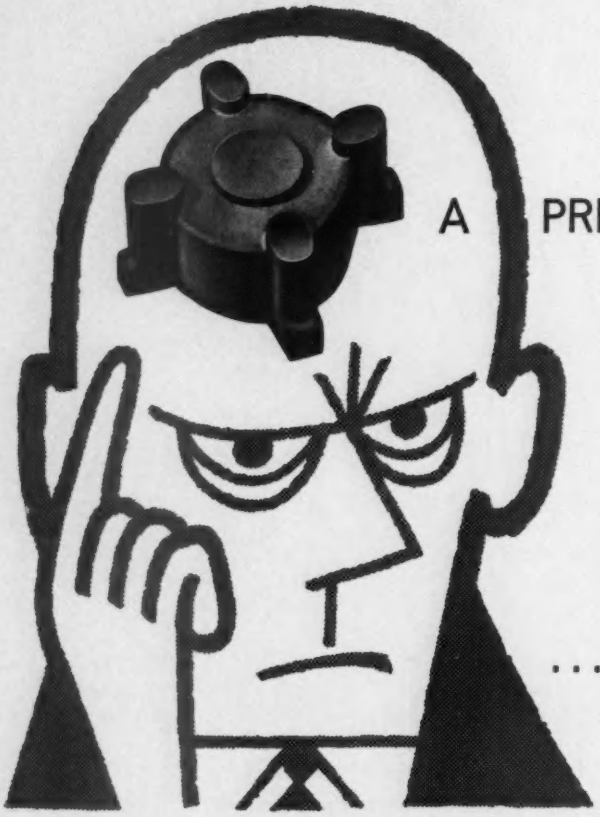

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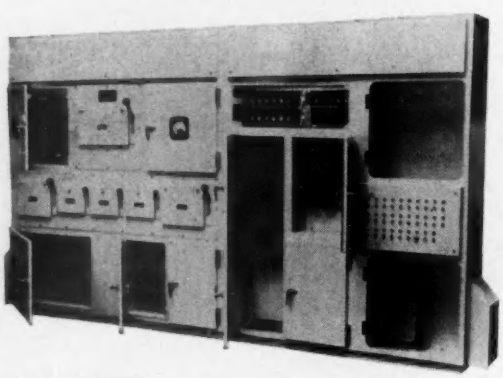

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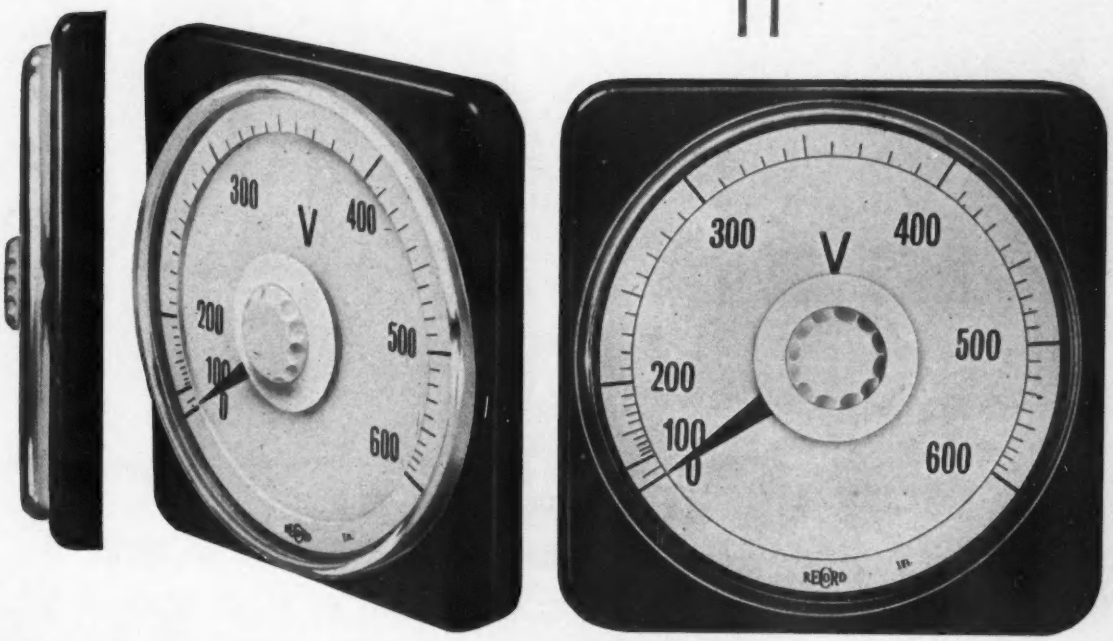

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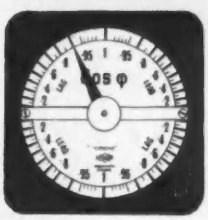

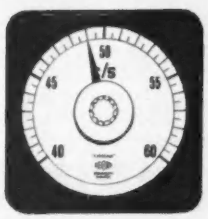

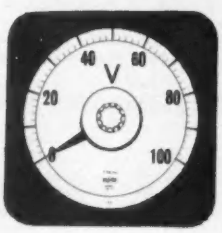

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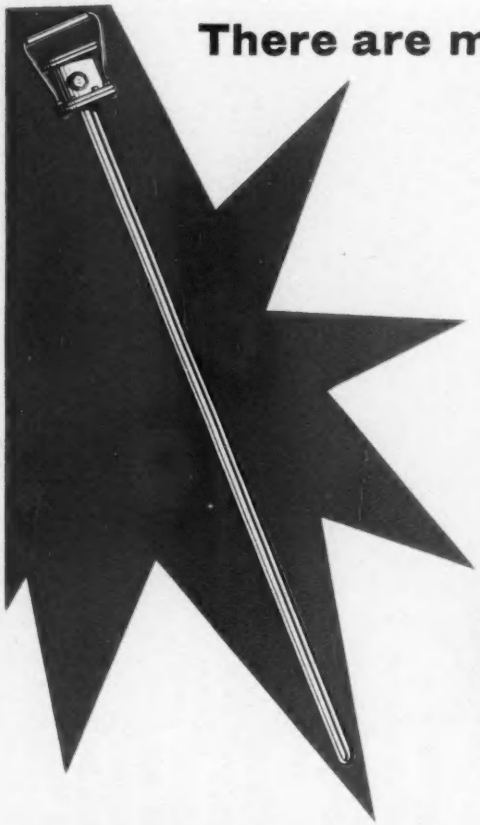

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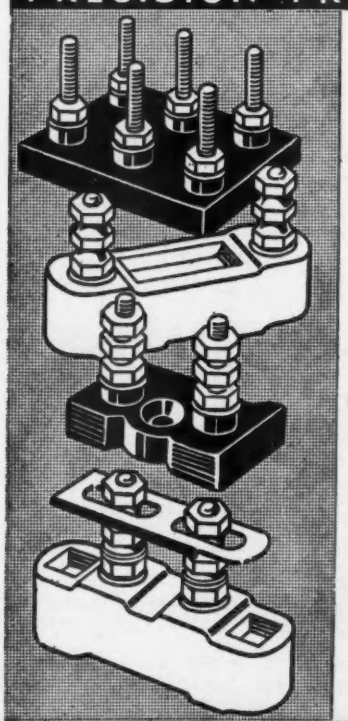

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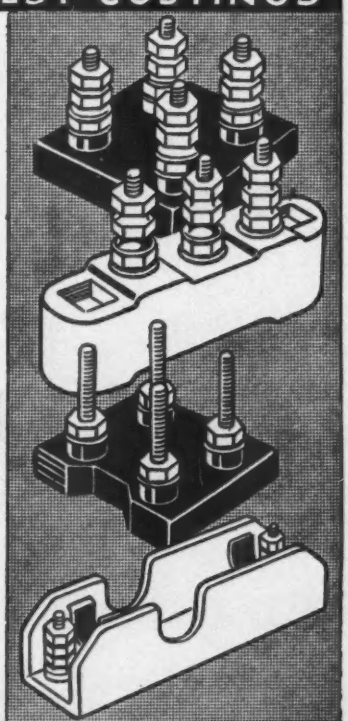

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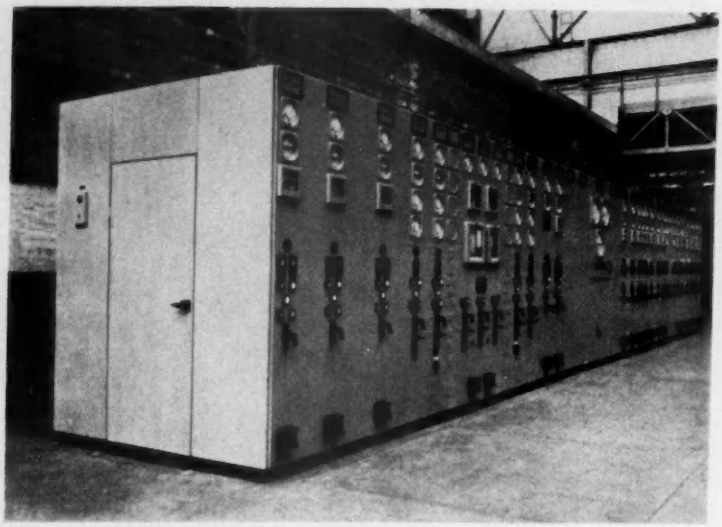

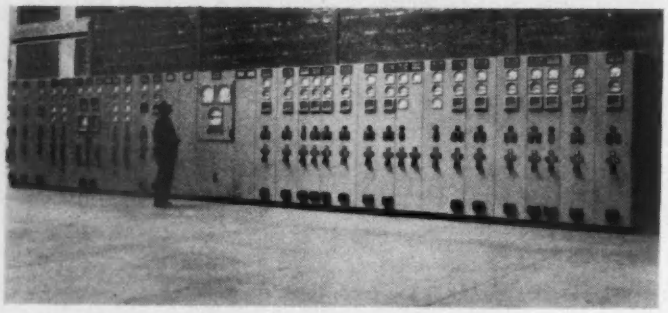

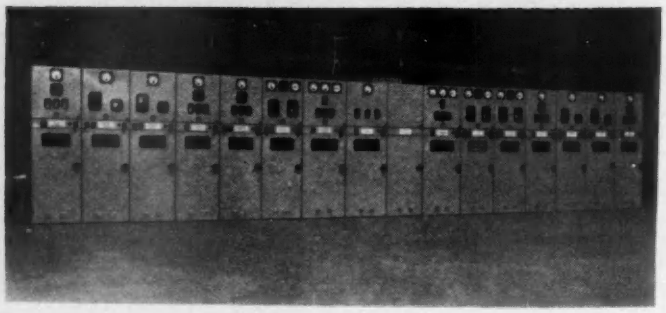

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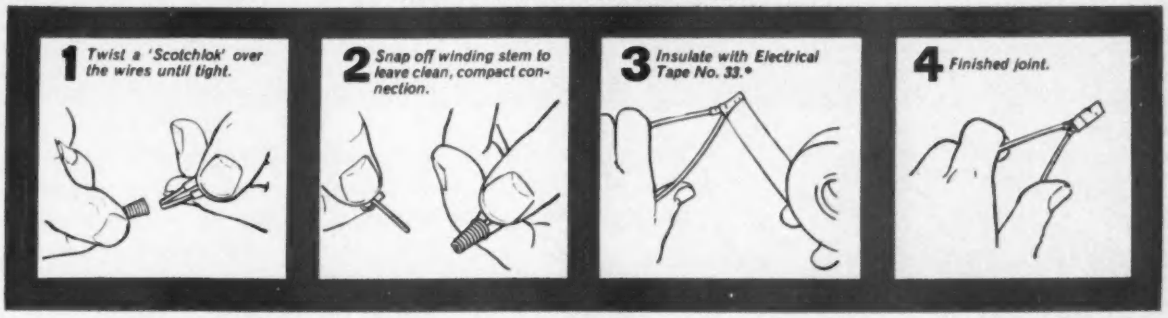
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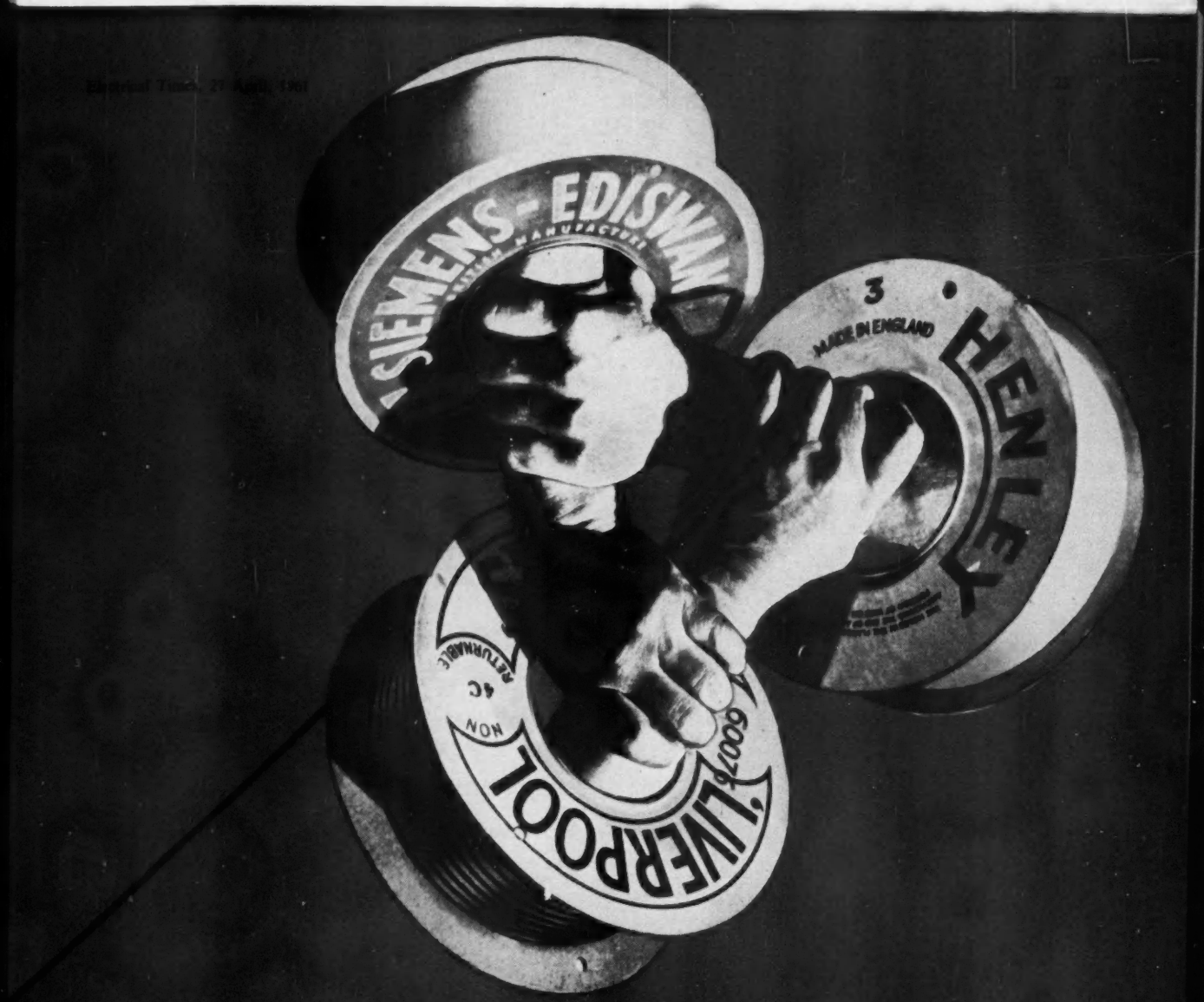

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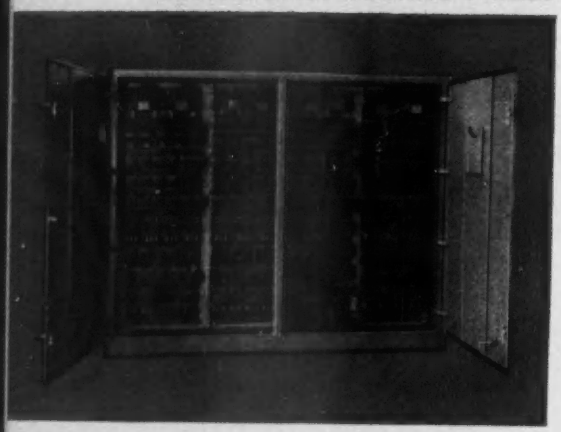
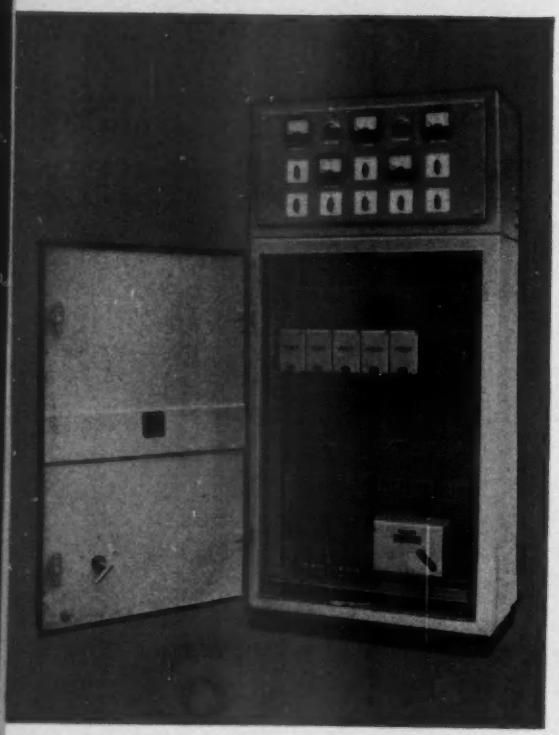
CUSTOM-BUILT CONTROL PANELS





If ever there was a case of "no set answer" it is in the field of automatic controls.

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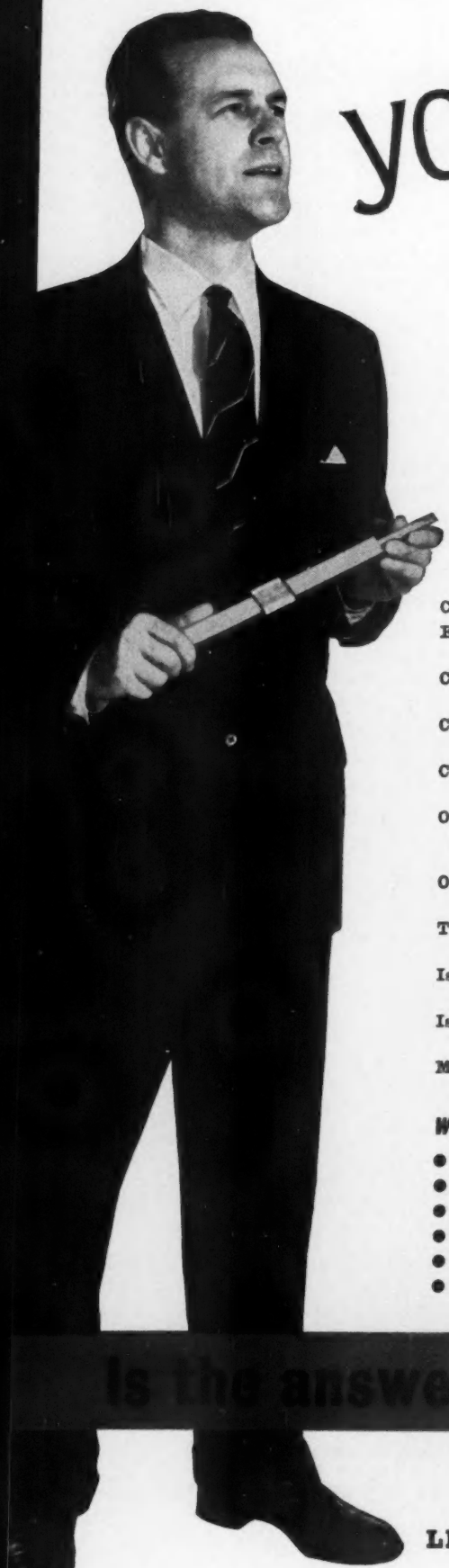
Whichever way you look at it, you'll find that **M.T.E.** 'double-service' is the answer.

Top left:
Control panel for eight-head rotary indexing machine.

Lower left:
Control panel for industrial refrigeration plant.

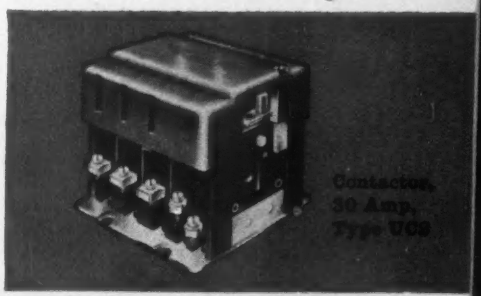
MTE 'DOUBLE-SERVICE'

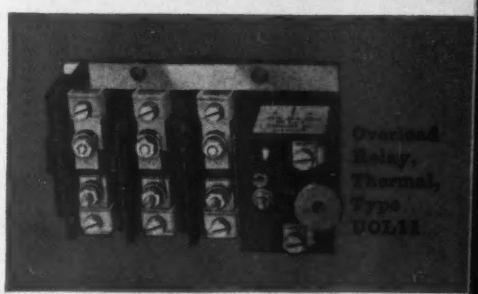
M.T.E. CONTROL GEAR LIMITED

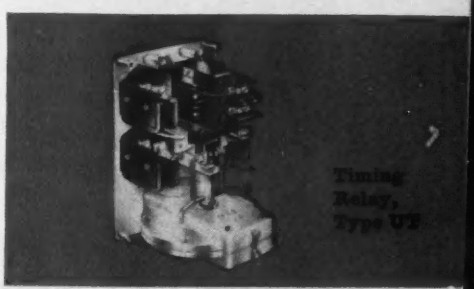


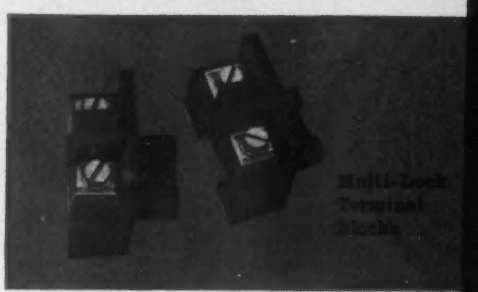
you look at it

COMPONENTS IN DOUBLE-QUICK TIME









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Contactors, 15 Amp, Type UC2L	7/9 days
Contactors, 30 Amp, Type UC2	7/9 days
Contactors, 75 Amp, Type UC3	7/9 days
Overload Relays, Thermal, with Single Phasing Protection	7/9 days
Overload Relays, Magnetic	9/11 days
Timing Relays, Type UT	13/21 days
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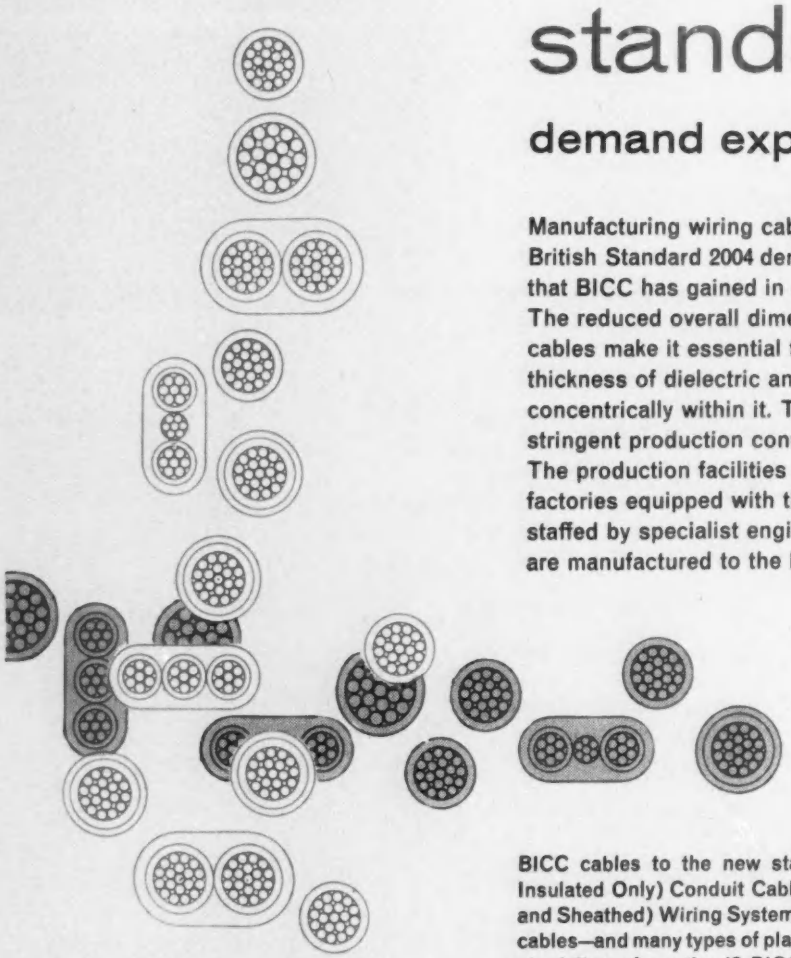

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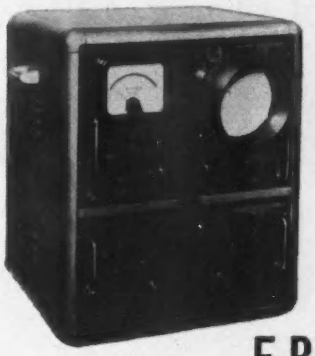

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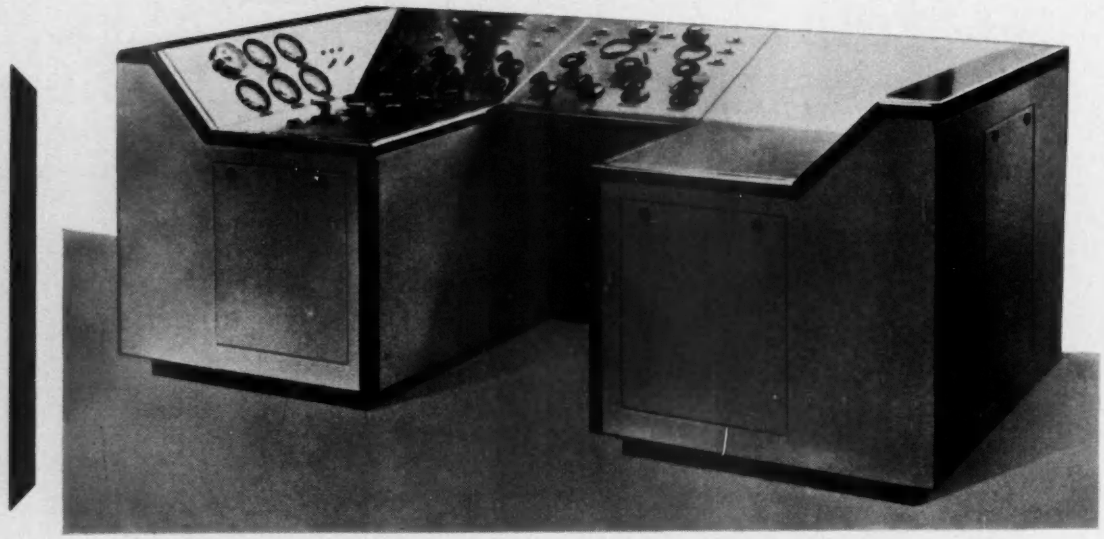

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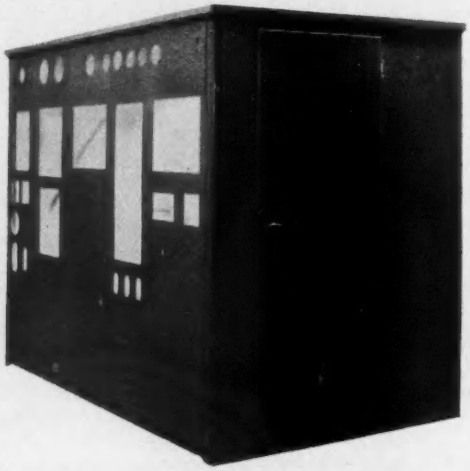

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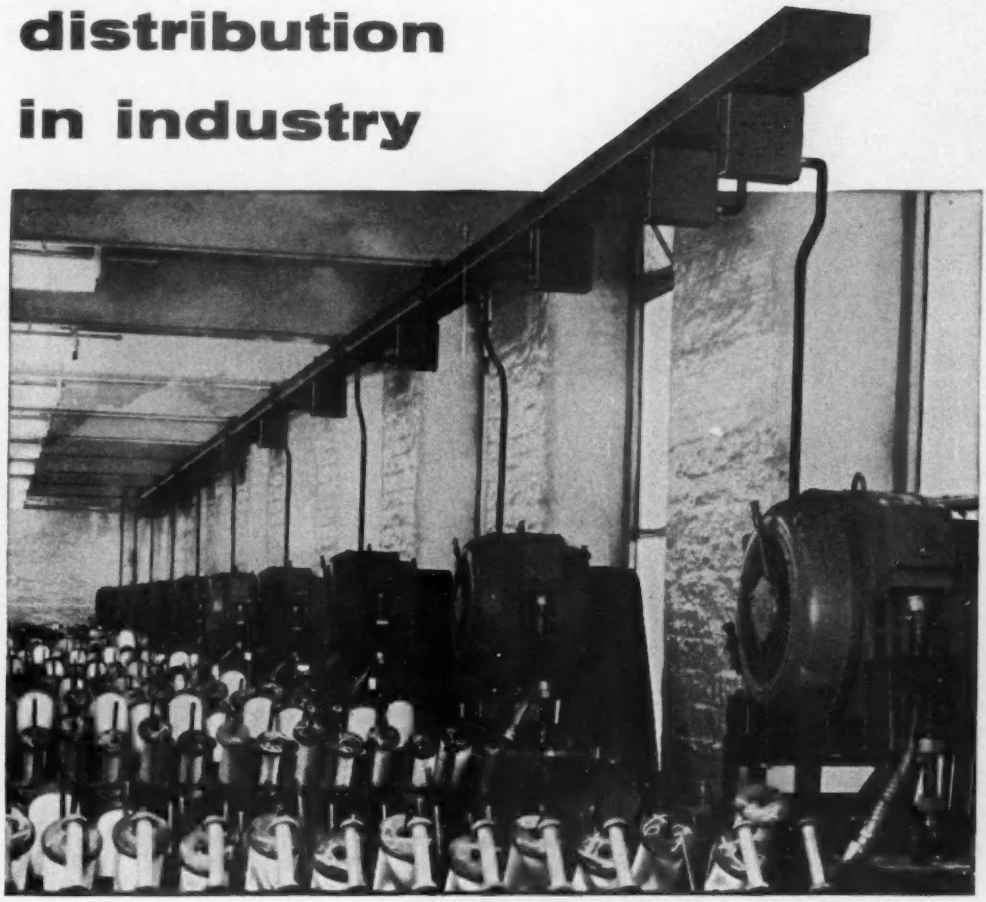
Overhead power distribution in industry



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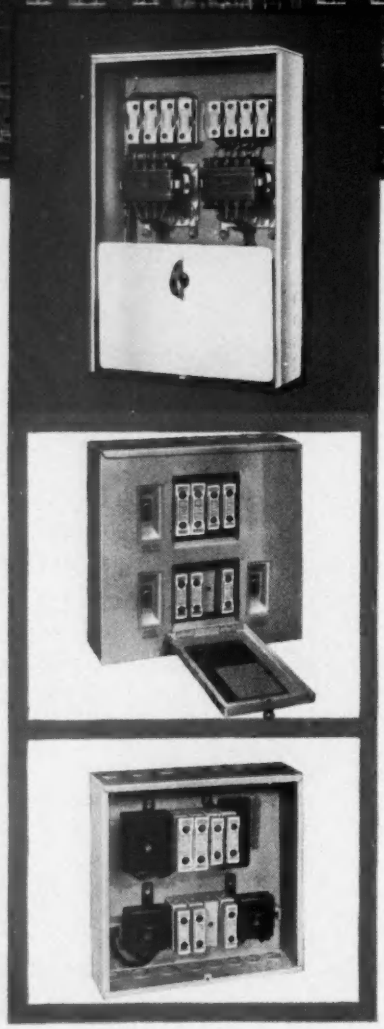

Master heating controller

Consumer control unit

Consumer control unit (open)

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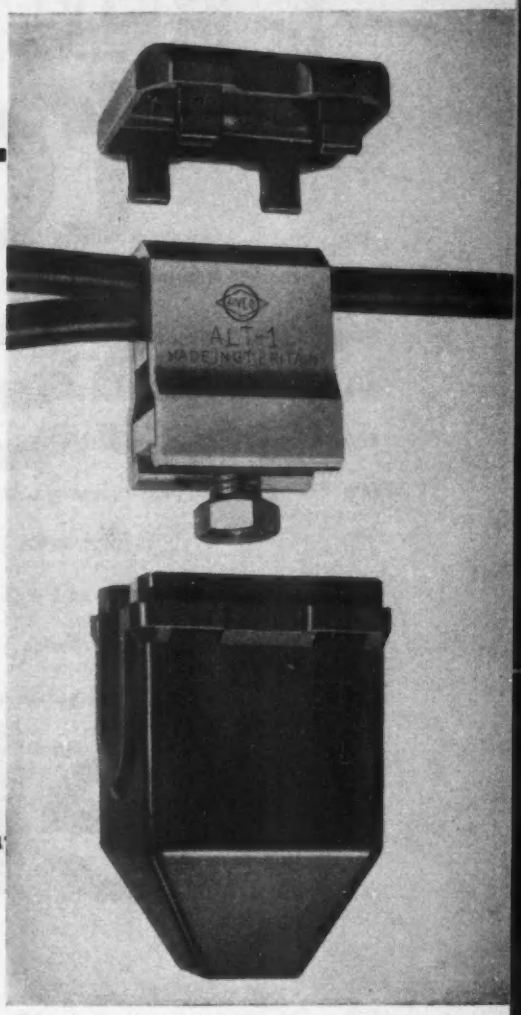

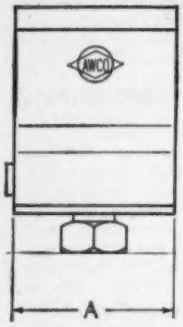

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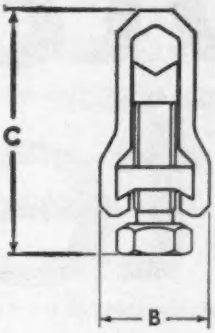
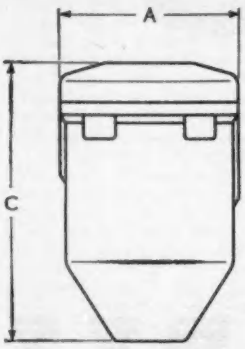
For all-aluminium, ACSR and Silmalec† Conductors

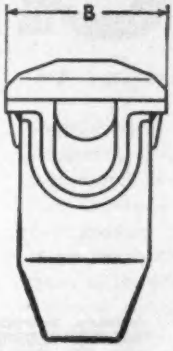


Catalogue Number	Main conductor diameter range	Maximum combined conductor diameters	A	B	C
	in.	in.	in.	in.	in.
ALT-1	0.177—0.366	0.732	1.300	0.875	2.375
ALT-2	0.367—0.558	1.038	1.875	1.175	3.250



INSULATING SHROUD

For ALT-1 saddle tap *



Catalogue Number	A	B	C
	in.	in.	in.
LTS-1	1.813	1.625	2.734
*LTS-2	Insulating shroud for ALT-2 Saddle tap available shortly		

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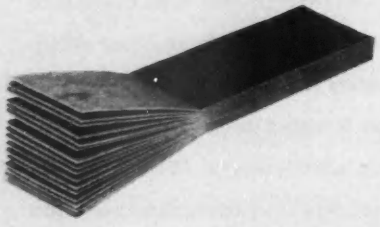

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THURSDAY 27 APRIL, 1961

Registered as a Newspaper Volume 139 No. 17

Dans ce numéro

Barres omnibus en aluminium pour Komati 665

Une station productrice de vapeur de 1.000 MW comportera un système de barres omnibus 10,5 kV tout en aluminium entre les générateurs et les transformateurs correspondants. Chaque jeu de barres avec blindage pèse 6 tonnes et comprend des sections en 'U' en alliage d'aluminium, reposant sur des isolateurs en porcelaine et comportant des accouplements intermédiares flexibles. L'on se sert de conducteurs tubulaires pour le passage à travers les manchons dans les cloisons de séparation.

Centrale électrique à contre-pression 671

La centrale électrique Spondon 'H' de la Central Electricity Generating Board a été conçue essentiellement pour fournir à une usine proche, de la vapeur de service, d'une pression de 11,25 kg/cm², d'une température 266°C d'un débit compris entre 182.000 et 227.000 kg/heure. La vapeur est fournie par l'intermédiaire de trois turbines à contre-pression accouplées à des alternateurs de 10,12 MW. Des soupapes réductrices de pression sont placées en dérivation des turbines, afin d'assurer que l'alimentation de vapeur soit continue. La pression et la température de la vapeur sont égales à 63,5 kg/cm² et 468°C respectivement. Aucune eau de condensation n'est disponible pour alimenter en eau les chaudières; une installation pour le traitement de l'eau—capacité 100%—est donc incluse, et les chaudières sont conçues pour réduire au minimum les problèmes de désincrustation.

Etude des câbles remplis d'huile 679

Grâce aux améliorations qui ont été effectuées quant aux matériaux d'isolement et de blindage de câbles, ainsi qu'aux techniques de fabrication, il sera possible d'accroître l'effort nominal des câbles haute tension remplis d'huile. Les améliorations dans le contrôle du recouvrement papier revêtent un caractère particulièrement important. Les essais effectués quant aux caractéristiques de vieillissement des câbles remplis d'huile à des températures de jusqu'à 120°C, semblent indiquer qu'il est possible de faire fonctionner pendant de très longues périodes de temps, des conducteurs à une température de 110°C sans risque de rupture et sans décroissement sensible de la durée de vie.

In dieser Nummer

Aluminiumsammelschienen für Komati 665

Ein dampfbetriebenes 1000 MW-Kraftwerk soll ein durchwegs aus Aluminium bestehendes 10,5 kV Sammelschienensystem zwischen den Generatoren und den an letztere angeschlossenen Transformatoren erhalten. Jeder dieser Schienensätze einschliesslich Abschirmung wiegt 6 Tonnen und umfasst Doppel-T Profile aus Aluminiumlegierung, die von Porzellanisolatoren getragen und über biegsame Verbindungsstücke aneinandergekuppelt sind Zum Durchgang durch Muffen in Trennwänden werden rohrförmige Leiter verwendet.

Kraftwerk mit Gegendruckturbinen 671

Das Spondon 'H' Kraftwerk des CEGB ist in erster Linie zur Lieferung von 182000 bis 227000 kg/h Arbeitsdampt mit einem Druck von 11,25 kg/cm² bei 266°C an eine benachbarte Fabrik ausgelegt. Der Dampf wird über drei mit 10,12 MW-Generatoren gekuppelte Gegendruckturbinen geliefert. Um eine ununterbrochene Dampfversorgung zu erzielen, hat man druckmindernde Ventile zur Umgehung der Turbinen vorgesehen. Letztere arbeiten mit einem Dampfdruck von 63.5 kg/cm² bei 468°C. Da zur Speisung der Kessel kein Kondensatwasser zur Verfügung steht, wurde eine Wasseraufbereitungsanlage von 100% igem Fassungsvermögen eingerichtet, und ausserdem verhütet die Konstruktion der Kessel weitmöglichst das Anlegen von Kesselstein.

Die Konstruktion ölgefüllter Kabel 679

Eine Steigerung der für ölgefüllte Hochspannungskabel vorgesehenen Beanspruchbarkeit erscheint im Hinblick auf verbesserte Kabelisolier- und Abschirmmaterialien sowie auf verbesserte Herstellungsmethoden gerechtfertigt. Fortschritte beim Steuern der Papierläppung sind hierbei von besonderer Bedeutung. Versuche, die die Alterungskennlinien ölgefüllter Kabel betrafen und bei einer Temperatur von 120°C unternommen wurden, legen den Schluss nahe, dass lange Betriebszeiten bei einer Leitertemperatur von 100°C zulässig sind und weder die Gefahr des Versagens erhöhen noche die Lebensdauer des Kabels wesentlich herabsetzen.

ELECTRICAL TIMES

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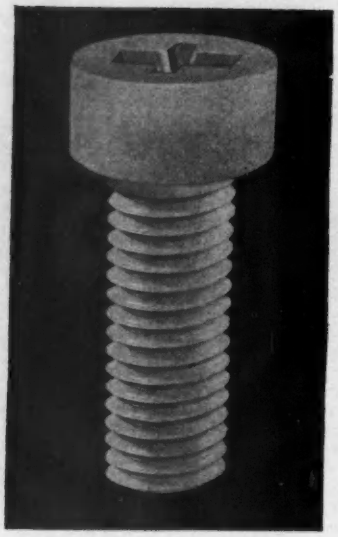

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ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 27 APRIL, 1961

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Comment

BUDGET REFLECTIONS

This year's debate on the Budget proposals in the House of Commons brought little fresh information to modify the impressions formed on the first impact of the Chancellor's speech. For the electrical industry there are two features of specialist interest: the change in practice regarding p.t. adjustments for the appliance side of the industry and the fuel oil duty for the supply side. It had always seemed improbable that regulation of the economy through p.t. changes would be forgone by the Government, even though they had undertaken to keep h.p. restrictions relatively constant. The new plan proposes, however, that the mopping-up of purchasing power which p.t. increases represents should no longer be concentrated in effect on a few industries, electrical appliance manufacture prominent amongst them, but should be spread more widely by way of affecting most Customs and Excise duties and all levels of p.t. This Budget proposal and the earlier h.p. undertaking promise a more even tenor of life for electrical trading and a better chance for manufacturing industry planners to estimate effectively. The oil duty imposition is also welcome to the industry in terms of competitiveness with oil for space heating where the proportional effect of 2d/gallon is likely to be around the 17% mark, perhaps more where quantity rebates are involved. For the supply industry's generating accounts, with oil purchased on a coal parity basis, the results are less predictable; 2d/gallon represents about 39s/ton, and for the five million tons of oil burnt last year that represents about £10 million/year in duty to be found by someone. Besides these particular concerns, the electrical industry is affected like all others by the payroll tax proposals and the vehicle duty increase. Payroll tax could cost the electricity boards an extra £2·1 million in a full year, but more important for the industry generally might be its discriminatory effect against apprentices. Just how this will work out will be uncertain until the Finance Bill is published; some saving clause may be available to avoid so unfortunate an influence.

STANDARDS DELAYS

Some of the speakers in last week's ASEE discussion on electrical equipment hit on a point of major topical importance when they complained of the delay that occurs in drafting standards and codes of practice. That the effects of delay should be felt is a tribute to the importance of standards, and if that importance is accepted throughout the industrial chain of command, then something can be done to reduce the delay. A major difficulty about all levels of standardisation

is that the urge to secure maximum agreement before requirements are expressed in mandatory form means that standardisation inevitably proceeds through discussion in sizeable committees. That may be acceptable, provided decisions arrived at by those involved in the discussions are afterwards endorsed; but this desiderata is by no means always secured and delays build up. A way out of the difficulty is for industry to make its accepted practice still higher level representation on standards committees and then back the decisions reached in all but the most obviously perverse cases. Individual firms may lose by this on occasion, or the principles of particular organisations be bruised but, overall, industry should gain. The effects of unduly tardy progress when it occurs are seen in many ways. One of the most notable is the open acceptance by some people of a draft standard as a basis for working, a move that can rarely find justification measured against the purpose of standardisation machinery. More important on a national scale is disregard for a standard that has got out of date without adequate replacement, or worse, the acceptance of foreign standards willy-nilly as the only alternative to being pushed out of the market technically by equipment designed to take account of materials and techniques not known when existing standards were drafted. There have been instances where BSI machinery has worked speedily. They need to be multiplied.

BACK-PRESSURE COMPLICATIONS

Spondon "H" power station, which we describe this week, is an example of what can be done in a combined heat and electric station when a suitable customer is at hand to purchase steam. It is also a salutary study for efficiency enthusiasts who call for more district heating and process steam schemes to be established in association with CEGB generating stations. With the heat in the exhaust steam at 160 lb/sq in. pressure credited to the cycle instead of debited, 70% efficiency is possible with the station operating at 80% load factor, but at a cost of considerable complexity of plant, hardly feasible for powers ten times greater than the 30 MW of Spondon "H." Because of the industrial process fed, no condensate is returned to the boilers, so 100% make-up is necessary. This is tackled in terms of boiler design rather than through full-scale, high-quality water treatment, and the dual circulation boiler design adopted, with its 20% continuous blowdown, sets a sharp limit to boiler size. Again, security of production demands that throttling valves should be provided to by-pass turbines, with temperature-regulating devices, so that when the sets cannot fulfil their pressure-reducing function, at least a partial supply can be given to the works. Although there are many heat loads where a return of condensate can be expected and where factors may exist easing the extent of emergency provisions required, water treatment and throttling are complications always likely to be present with back-pressure schemes whether they be intended for district heating or process steam supply. To hope for application of back-pressure generation extending much beyond special-purpose stations such as Spondon is unrealistic.

SLOWING DOWN SUPPLY DEMAND

The monthly review of electricity supply statistics which we publish on a later page marks the end of a financial year for the English and Welsh electricity boards. Despite mild, if wet, weather, the year is showing an increase of 11·1% in electrical energy sold, not a record, but the highest figure since 1955 and better even than that when adjustment is made for the effect of weather and similar factors. Yet the buoyancy of the industry that these figures indicate seems a little less than in the autumn of 1960. There has been a discernible fall in the rate at which sales of units are estimated to have increased after adjustment has been made for equivalent weather conditions and the number of working days in each calendar period. While that adjustment itself is an approximation, so that too much must not be expected when there is a wide difference of weather between corresponding months of two years, it seems likely that a significant slowing down in rate of expansion has, in fact, occurred. Not that a corrected rate of about 10% is to be regarded as any slur on the industry's selling effort, 7% has for long been regarded as the norm for a well-developed industrial country such as Britain; but long-term estimates should not accept too much influence from the recent 12%-plus rates of annual increase.

UNDERSEA TRANSMISSION IN SCOTLAND

Submarine cables operating at 33 kV are planned by the North of Scotland EB to connect the islands of Islay and Jura, in the south west of their district, to the mainland transmission system. The scheme presents a vivid illustration of the high cost of diesel generation to the Board, for there is already a diesel station of more than 2 MW capacity on Islay—yet it is more economical to bring in a connection to the hydro-fed system. Over seven miles of submarine cable will be involved, laid as a duplicate cable at depths down to 500 ft, where the hydrostatic pressure will almost equal the internal pressure in the gas-filled cables to be used. Islay, from a diesel point of view, is particularly expensive, for there are 12 miles of road to be covered by oil lorries between the nearest deep water port and the power station; but the difference between the overall diesel and hydro generation costs given in the last Hydro Board report provide an indication of other cost factors involved. At 1·75d/unit sent out, diesel generation was nearly 2¼ times as expensive as hydro-based electricity. That differential is only partly covered by the higher charges that are applied, where diesel generation is used for the public supply.

Meteor

This week's quick summary of electrical news faces advertisement page 12

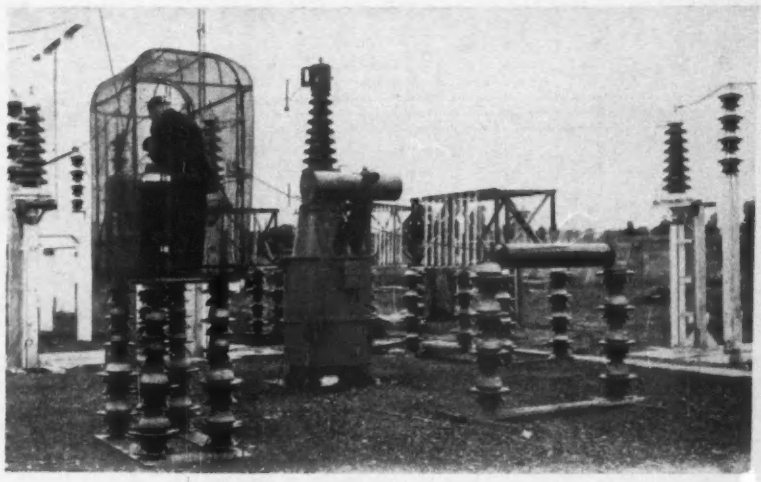


Fig. 1. Testing the dielectric power factor of a 132 kV cable after laying demands the use of a Faraday cage to house the Schering bridge and the test personnel. The cable is installed at a CEGB substation, and was connected for test as shown in Fig. 3

TESTING

A 125 kV/cm OIL-FILLED CABLE ON SITE

AN obvious way of reducing the capital cost of high voltage cables is by operating the dielectric at a higher electrical stress, so saving in material. Cable manufacturers have for long pursued this course, but there is controversy about how far it should be followed (see the article on p. 679, for example).

Pirelli-General Cable Works Ltd. have recently carried out an extensive programme of development work, followed by complete official type approval tests in accordance with the requirements of the CEGB on three-core 132 kV, oil-filled cable and accessories designed to operate at a maximum stress of 125 kV/cm. Table 1 shows the reduction in size that results with this stress.

Notwithstanding the most searching tests which cable and accessories have successfully withstood, the advanced nature of this design has made the CEGB reluctant to accept it without service experience from a trial installation, and it has been agreed that a 565 yd length of 3 core 0·40 sq in. 132 kV (125 kV/cm) cable complete with straight and stop joints should be installed at the Norrington substation of the CEGB, Southern Division (Fig. 2).

To meet CEGB requests, it has been arranged that dielectric power factor tests should be carried out after installation and again after a trial period of three years, and that the circuits should then be removed from service and sections returned to the Pirelli-General works.

The trial circuit consists of six outdoor-type sealing ends, one trifurcating open joint, one stop joint, one splitter box 75 yd s.c. 0·40 sq in. 132 kV (125 kV/cm), oil-filled cable and 565 yd of three-core 0·40 sq in., 12 yd of which is trifurcated through corrugated aluminium tubes (Fig. 3).

Power Factor Tests

Owing to local conditions it was not possible to carry out power factor tests immediately after installation. They were, however, made after a few months' operation, in the presence of CEGB representatives.

It is many years since such tests have been carried out in the field of high voltage cable systems and the test method is of interest.

The normal method of power factor measurement in cable investigations is by the Schering bridge circuit, which involves having the cable sheath lightly insulated from earth. Although the anti-corrosion protection makes it possible to insulate the cable sheath from earth in the field, it is still not practicable to use the laboratory test technique, because of the very large capacitance of the sheath to earth when the cable is buried. This would introduce unacceptable errors.

Table 1. Comparative Design Dimensions

Dimension	110 kV/cm	125 kV/cm
Dia over screened conductor ...	0·786 in.	0·786 in.
Dia over screened core	1·63 in.	1·151 in.
Dia over lead sheath	3·82 in.	3·57 in.
Dia overall	4·45 in.	4·20 in.

The method used for the field tests was, therefore, an "inversion" of the normal Schering bridge circuit. This

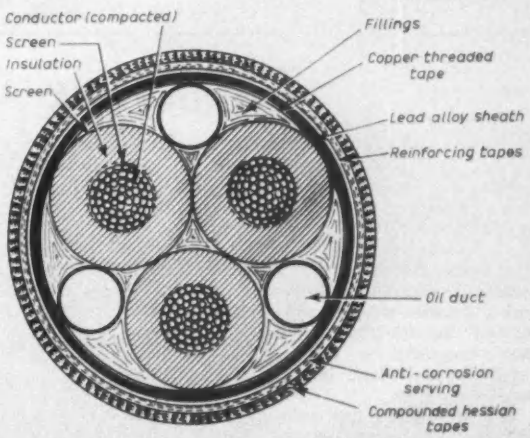


Fig. 2. Constructional details of three-core 0·4 sq in. oil-filled cable for 132 kV. The cable has compacted tinned copper conductors screened with two carbon-loaded papers. Impregnated paper is used as the insulation for each core, which is screened. The three cores are laid up with impregnated paper fillings and an aluminium spiral oil duct is provided in each interstice. The sheath is lead alloy, reinforced with tin bronze strip. The anti-corrosion serving is a p.v.c. tape, double rubber tape and another p.v.c. tape with compounded hessian double tapes overall

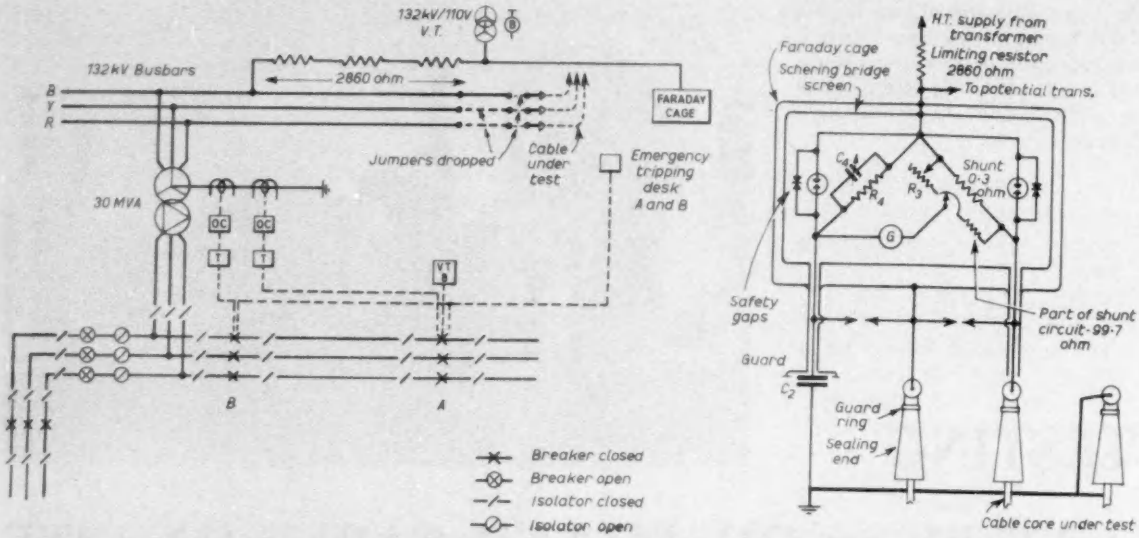


Fig. 3. Supply and protection arrangement for cable tests (left) and circuit diagram for power factor measurements (right). In the Schering bridge circuit, C_2 is a standard capacitor, 100 pF, 100 kV; C_4 a decade capacitor of 1 microfarad top value; and R_3 a decade resistor of 1,000 ohm top value. R_4 is a fixed resistor of 318·3 ohm. G is an electronic a.c. detector

enables the cable sheath to be directly earthed, but it also means that certain parts of the bridge circuit and the operator must be alive at the potential at which the tests are made. To make this possible with safety it is necessary to use a "Faraday cage" composed of wire mesh.

The cage containing the operator and certain parts of the bridge circuit was mounted on insulators about five feet from ground level (Fig. 1).

The supply for carrying out the tests was taken from a 30 MVA transformer in the CEGB Norrington substation with a resistor of 2,860 ohms interposed to limit the current in the event of flashover or breakdown of the equipment under test (Fig. 3). Each of the three cable cores were tested separately, with guard rings fitted on the porcelain cable terminals at each end to eliminate the effect of surface leakage.

As expected, the tests results were entirely satisfactory (Table 2) and indicated that no deterioration has occurred during installation and jointing nor during the few months the cable has been in service.

Table 2. Cable Dielectric Power Factor

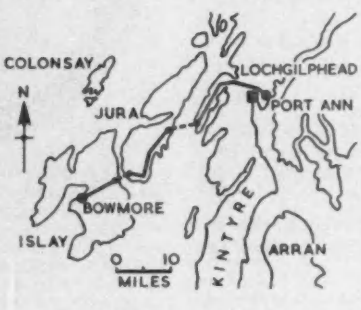
kV	Red Phase	Yellow Phase	Blue Phase
67·1	0·002453	0·002477	0·002451
76·8	0·002455	0·002480	0·002460
80·2	0·002452	0·002483	0·002467
82·5	0·002455	0·002487	0·002469

The tests will be repeated with the same testing equipment and under identical conditions after the three years trial period and it is confidently expected that no deterioration will have occurred.

Submarine Cable for Islay

SUBMARINE cables are to be used by the North of Scotland HEB to connect the Island of Islay with the mainland supply network. The connection will also make available electricity supplies on the Island of Jura. Special considerations exist which make diesel generation relatively expensive on Islay, and a detailed analysis some time ago showed that in 1961 it should be no more expensive to take a mainland supply to the island than to continue diesel generation.

The submarine cable crossing will be just over 6¼ miles from the mainland to the Island of Jura, and another 1¼ miles from Jura to Islay. Also involved in the work, to be carried out this year, is 42 miles of wood pole line. Between the mainland and Jura, the sea bed falls to a depth of 84 fathoms, giving an external pressure of 224 lb/sq in. The connection is to be made using two three-core 0·1 sq in. gasfilled 33 kV cables with an internal gas pressure of 250 lb/sq in. For the connection between Jura and Islay, where the greatest depth is only 14 fathoms, two 0·1 sq in. three-core pre-impregnated paper-insulated HSL solid type 33 kV cables are to be used. BICC will supply both cables.



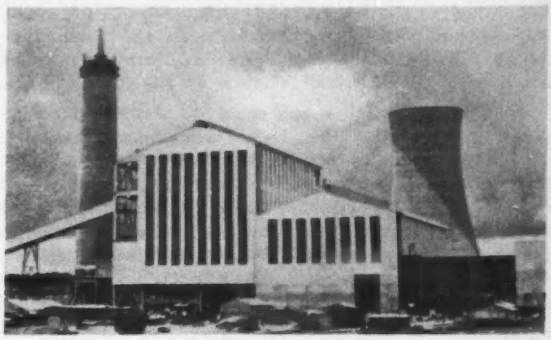
Cable route to Islay

At present Islay has a demand of about 2 MW. This is met by diesel generation at the Bunanuisg power station at Bowmore (three 600 kW sets and two 265 kW sets). Fuel oil has to be transported by road for 12 miles from the nearest practicable deep-water pier. Jura has no electricity supplies at present but the opportunity will be taken of providing consumer connections to the 33 kV line that will cross the island. The possibility of a small hydro station on Jura is to be investigated.

On Islay, the submarine cable landing point will be connected to Bowmore along a route selected to facilitate reinforcement to the existing 11 kV network on the island. The line will terminate at the generating station with a connection to the station busbars through a 3·5 MVA transformer.

Aluminium bus for Komati

SHORT-CIRCUIT TESTS AT CROMPTON PARKINSONS



Komati Power Station

THE new thermal generating station at Komati, Eastern Transvaal, now in course of erection for the Electricity Supply Commission of South Africa, will have an ultimate capacity of 1,000 MW and, when complete, will rank among the largest stations in Africa. The first two 100 MW sets should be in operation by the end of the year.

The generators are of AEG design and manufacture and have a rated output of 6,100 A at 10·5 kV. This is transformed, for distribution, through 110 MVA ASEA 10·5/300 kV delta/star outdoor transformers with solidly earthed neutral on the 300 kV side. With a 12·3% reactance, the fault capacity on the outgoing side of the transformer is estimated to be 12,500 MW at 275 kV. The neutral point of the generator is earthed through a 5 kVA neutral earthing transformer with an equivalent resistance of 3,000 ohms at the rated voltage. For local distribution and station auxiliary services, 10·5/6·9 kV, 10 MVA unit transformers, by Ansaldo-San Giorgio of Italy, are also fed from the bars, one per generator.

The Busbar System

Aluminium busbars are used by ESCOM in this installation for the first time for connections between the generators and the main and unit transformers. Each busbar assembly weighs about three tons or, with its aluminium screening, close on six tons. The successful tenderers, Messrs Hubert Davies and Co., of Johannesburg, had the co-operation of the Aluminium Company of Canada in preparing the design and specification, the latter having had extensive experience with aluminium busbars in their own plants totalling more than 3,000 MW.

The material chosen was a magnesium silicide-aluminium alloy to specification D50S with a minimum u.t.s. of 29,000 lb/sq in. and a minimum conductivity of 55% IACS. The same alloy was used for the angle and tees of the enclosure clad with "Expamet" aluminium screening welded in place.

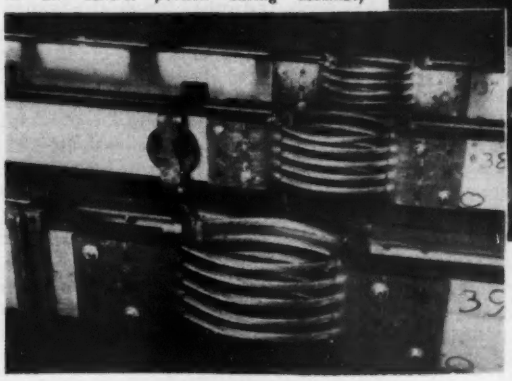
The busbar assembly is in the form of a "dog-leg" with a 48 ft 6 in. central portion. The first bend, of 17 ft 6in. mean length, provides the connection with the generator and the second, which passes through the walls of the generator hall, has a mean length of 20 ft and provides the connections to the generator transformer. Other connections, teed from the central portion and also passing through the wall, supply the unit transformer.

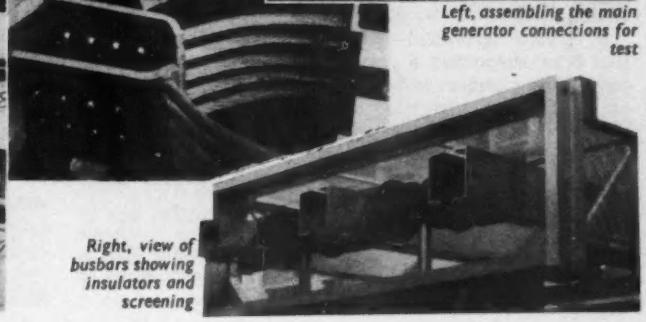
For the purposes of testing, the busbars are divided into a number of zones. The main zone, comprising the first bend and the central portion, incorporates busbars of paired 10 in. by 3 in. channels (Alcan shape 91018), flanges inwards, having a combined weight of 17·12 lb/ft run.

Right, the flexible connection between the channel and tubular busbars

Left, assembling the main generator connections for test

Below, a general view of the expansion joints in the central portion during assembly





Right, view of busbars showing insulators and screening

These are supported on, and separated by, horizontal back-to-back, shed-type porcelain insulators mounted on pillars in the main framework. The insulators are supplied by Steatite and Porcelain Products of Stourport.

The central portion is split into two sections at a mid-point, interconnected by flexible aluminium conductors welded, in groups of five, to end plates which are bolted to the ends of the channels. Similar flexible connections couple the busbars at the bends and also provide the connections between generator terminals and busbars. Additional plates, situated between the two supporting insulators in each section, give extra rigidity to the busbars which, in this zone, have a total impedance estimated at 42 microhms/ft at rated loads.

Zone 2, between the central portion and the transformer terminals and forming the second bend, is in the form of a 10¾ in. by ¼ in. wall thickness aluminium alloy tube closed at each end by plates, with webs, welded to the tube, the webs forming connecting flanges for other flexible connections. The change of section is prompted by the consideration of passage through an insulating bushing, at the dividing wall, which is more conveniently made in cylindrical form. The weight of the tube is 18·87 lb/ft run and the estimated impedance, 46 microhms/ft. For similar reasons, tubular section busbars, of 3 in. standard pipe size and with a weight of 2·617 lb/ft run, are also adopted in the third zone between the central portion and the unit transformer terminals, the impedances here being estimated at 62 microhms/ft.

Test Specifications

The specification laid down a programme of testing in accordance with BS 159, "Busbars and Busbar Connections," and BS 2817, "Enclosure of Electrical Parts." These call for minimum phase-to-phase clearance of 9½ in. on the 11 kV busbars with 5½ in. minimum to earth. Impulse test voltages called for on 11 kV busbars are 160 kV crest and 55 kV r.m.s. for 1 min 50 c/s at sea level. The short-time current test specified was 46,100 A for 3 sec in the first and second zones and 82,100 A for 3 sec in the third zone, both with a 70% d.c. component on the centre phase at the instant of short-circuit. In regard to temperature rise tests, the limiting temperature of 30°C above ambient applied in the first zone to a current flow of 6,600 A; in the second zone to 6,260 A and in the third to 1,520 A.

Test Arrangements

In December, 1960, it was decided that testing of the assemblies could be carried out more expeditiously and cheaply in England, and the London Office of Hubert Davies Ltd. approached the Short Circuit Testing Station of Crompton Parkinson Ltd., who undertook to do the tests at Chelmsford. This gave rise to an urgent demand for a set of screening to be made in Britain and the three-ton structure was fabricated, completed and delivered by G. and E. Engineering, of Clapham, with material supplied by Alcan Industries, by 27 March. This enabled the testing programme to be completed on schedule, and an invitation was sent to a number of British electrical engineers to witness some of the tests at Chelmsford on Tuesday, 18 April.

Because of test equipment limitations, the test programme varied from that laid down in two aspects. The short-time test current of 82,100 A in the third zone was beyond the capacity of the plant at Chelmsford and a current of 62,000 A was applied instead as an equivalent test in accordance with Par 2 of Appendix F in BS 159. Similarly, the long period current of 6,600 A in the first zone also exceeded the capacity of the testing station and approval was given for the test to be carried out at 3,000 A and below, the value at the higher figure being obtained by extrapolation of the resulting curve.

The tests were witnessed by prominent engineers and consultants from the electrical industry, the CEGB and also, on behalf of ESCOM, by Mr A. R. Johnson. A full report will be issued in due course, but it was evident to all present that the assembly was more than adequate to deal with the worst faults likely to arise in practice.

New Bulletin on Floor-warming

A NEW bulletin,* just released by the Electrical Floor Warming Association, gives useful hints to building and electrical contractors engaged on the installation of directly embedded systems.

It is, of course, well known in both trades that successful and economic working of an embedded system can only result if those who have contributed to its installation have duly observed all precautions to achieve maximum electrical and thermal insulation. While, therefore, some of the observations in the bulletin may appear to be rather obvious, it does no harm to have them restated if only to push home the importance of careful and responsible workmanship.

A directly embedded system usually comprises a solid slab floor supporting a regular pattern of heating cables covered by a cement and sand screeding. The responsibility of the building contractor extends to the casting of the slab, its thermal insulation around the perimeter and under the slab, as may be called for, and also to the application of the screeding after the cables have been laid. The forms of insulation available and the extent to which they must be applied are stated, together with precautions to be taken to render the slab proof against dampness. The effect of fitted carpets and fixtures and fittings with a ground clearance of less than 3 in. is also dealt with. With the cables in place, the next step is laying of the screeding—which should be applied as dry as possible—during which process the pattern of cables must not be disturbed. Precautions must be taken to see that they are not damaged by building appliances, hob-nailed boots and other forms of common maltreatment on building sites.

The responsibility of the electrician is, above all, to be fully informed on the details of the wiring system, its cables and its accessories. Makeshift use of nails and spigots is "deprecated" where special spacers are provided by the manufacturers and a warning against tensioning the joints between heating cable and cold tails is given. Other precautions are concerned with the obvious point that the heating cables must not be shortened without reference to the designer or manufacturer and steps to be taken where metallic screed reinforcement or acoustic insulation is used. Continuous monitoring of the circuit is recommended, to avoid faults not being found until after the job is complete, and a final paragraph gives advice on drying-out periods before switching-on.

* Bulletin A/61: "Installation of Directly Embedded Electric Floor Warming Systems," The Electrical Floor Warming Association, 83-86 Saffron Hill, London E.C.1.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Canadian Off-peak Control

I READ with interest *Meteor's* comments in 23 March issue on off-peak water heating, where he mentioned some easy means of switching on and off such heaters. This can easily be done by installing with each immersion heater a frequency sensitive relay. When the electricity authority want the heaters on or off, they inject a high frequency pulse on the line.

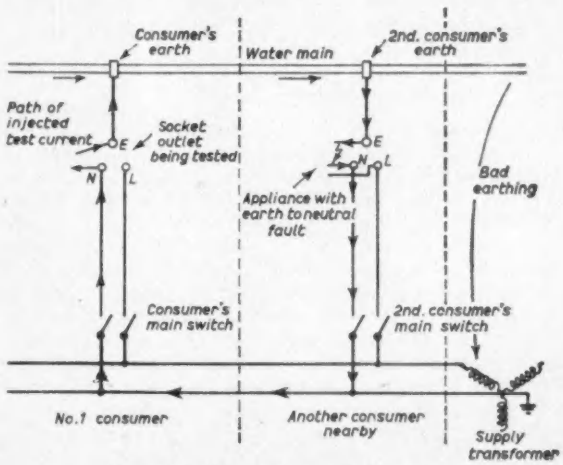
This system is widely used in Canada, where the supply to the heater by-passes the consumer's meter and is switched on and off at the will of the supply company to suit the prevailing load conditions. A 600 c/s pulse is used, and the relay is of the latching type.

The consumer pays a fixed rate per month, in Ontario this was $4.50. Hot water was generally available unless of course three baths were attempted in a short period.

W. D. Hawthorn,
MORDEN,
SURREY.

Earth Loop Testing

WITH reference to Notes on Wiring in your 23 March edition, I note you give a big build up with reference to the NICEIC inspectors' loop testing equipment. This type of equipment is now in common use, but I fail to see how it can be regarded as a safe



Neutral-earth fault affecting a loop test

test. In many cases where it gives a good reading it is due to a nearby consumer having an earth-to-neutral fault on either his installation or on a plugged-in appliance. The diagram illustrates this point.

R. W. Marrison,
ATTLEBOROUGH,
NORFOLK.

* * *

AS Mr R. W. Marrison's letter makes some mention of the NICEIC and earth loop impedance testing equipment, the Editor has invited me to comment.

First of all, I could wish that this type of equipment was in "common use," but the best we can say at present is that it is becoming more generally used, and the Council hope to see a much more universal application of the tests laid down in Regulation 507.

I think it rather unfortunate that Mr Marrison used the term "safe test," as this type of testing equipment is perfectly safe when used for carrying out tests on installations. I think the purport of Mr Marrison's comment would more adequately be conveyed by the use of the word "reliable" instead of "safe."

However, to answer the point raised I would like to use the following analogy. Would Mr Marrison neglect to ensure that the brakes of his car were in proper working order if he considered that another vehicle on the road might have no brakes at all?

In other words, it is important for the electrical installation contractor to ensure that the installation work for which he has been responsible complies in all respects with the requirements of the IEE Wiring Regulations, including Regulation 507, and to ensure that the installation remains in proper and safe working order by convincing his customers that periodic testing and inspection of the installation is essential.

If all installations were subjected to such a periodic test and inspection, then the installation with the fault between neutral and earth would be brought into compliance with the Regulations.

It may be of interest to note that the Council's inspecting engineers have had a number of instances where an unduly low reading has been obtained when conducting a neutral/earth loop impedance test and the subsequent investigation has revealed that there was a neutral-to-earth fault in the near vicinity.

E. J. Sutton, M.I.E.E.,
CHIEF TECHNICAL OFFICER,
NATIONAL INSPECTION COUNCIL FOR ELECTRICAL INSTALLATION CONTRACTING.

MVAr in Supply Planning

MY attention has been drawn to page 589 of your issue of April 13 where I am reported in the discussion on the IEE paper by Messrs Casson and Sheppard as having said in comparing tariffs based on kVAr with those based on kVA: "As kVAr tariffs introduced metering complications, it was not easy to measure to appreciably better than 1½%, which did not seem good enough for large consumers." In fact, I said this about kVA tariffs and it does not apply to kVAr tariffs.

P. d'E. Stowell, B.SC.(ENG.), M.I.E.E.
CHIEF ENGINEER,
MERSEYSIDE AND NORTH WALES EB,
LIVERPOOL 3.

Earthing Difficulties

ALL of us tend to have some pet fad, mine is earthing. But every day brings instances to indicate how many are the installations that fall short on this point. First one finds that many cookers, after a period of use, get the pins corroded and covered in boiled over residue (I refer to plug-in rings and grills). The answer—regular inspection, and in new models provide a separate earth wire linked to a common screw as in Belling 53, etc.

Then we find that plumbers are making improvements

to bathrooms that sometimes means replacing lead piping with alkathene, and the fitting of metal sink units and built-in metal fixtures. Unless the fitter is a conscientious type these installations could be a source of danger. The answer in the case of local authorities is to get a statement from the plumbers that the inspection on completion of works is also satisfactory from an electrical standpoint. However, this only applies to grant works; but what do we do about the local do-it-yourself type, or village handyman?

The final blow came recently when I called at a farm wired by ourselves. A milking plant had been installed by a reputable firm and connected to our 13 amp socket in a very slip-shod manner, and, further, a piece of alkathene pipe inserted in piping from unit was not bonded across, so that the whole of the pipework in the shippen could become alive under fault conditions. I was trained in the Midlands but understand some 50 V is dangerous to livestock. I wonder how many other farms are similar? My guess, dozens. In this instance the owner has written to the plant suppliers in no uncertain terms.

Even reputable suppliers of fittings are guilty of non-compliance with IEE Regulations. One answer to a complaint about lack of earth wire on a metal-cased TV lamp was: "We also supply shops and their customers may only have two-pin sockets." My answer would be to supply only fittings of an all-insulated type to such customers.

I do not know what the answer to all this is, although the EAW and NICEIC are doing good work.

E. J. A. Francis
BRATTON FLEMING,
NORTH DEVON.

Economic Water Heating

IT is amazing to read of the tricks electrical engineers get up to in order to reduce the cost of heating water by electricity. The note, "Economic Water Heating," in the 23 March *Problems and Practice* page is an example. Relays, time switches, etc., are entirely unnecessary if the installation is properly designed and properly lagged. Given this standing, losses are low enough to be disregarded.

This over-complication of the subject shows a considerable lack of appreciation of the good work already done by electrical water-heating engineers all over the country. A well-designed electric water-heating installation can be switched on and left to look after itself with the same confidence one places in the ball valve in a feed cistern to keep it filled with cold water.

P. Honey, A.M.I.E.E.
ELECTRICAL DEVELOPMENT ASSOCIATION,
LONDON, W.C.2.

E.R.A. Wind Generator Experiment

A MAJOR problem in applying wind power to electricity generation is how to exploit its full potential under varying wind speeds encountered in practice. One solution is to incorporate a system of automatic control to the particular installation whereby the consumer's load is always kept matched to the instantaneous maximum output of the wind generator. To assess the practicability and economics of such a system for supplying houses and small farms in remote districts, the ERA recently conducted an experiment using the installation of a seven-roomed house in the Cairngorm nature reserve. The installation, 1,100 ft above sea level, was connected to an Allgaier type wind generator having a three-bladed, variable-pitch rotor driving a three-phase alternator with a nominal output of 7·5 kVA at 380 V, 0·8 p.f. To this was coupled an exciter, which provided an additional 1·5 kW at 240 V d.c. for external use. Regulated to "cut-in" as soon as wind speed exceeded about 11 m.p.h., the wind generator was designed to achieve maximum output at 23 m.p.h. and above.

For practical purposes the domestic load was divided into two sections. Services such as lighting, radio and ironing facilities, demanding a firm supply at steady voltage, were provided for by a 240 V, 20 Ah accumulator kept on charge by the suitably regulated d.c. output from the wind generator. The remainder of the installed load, comprising water and space heating plus a 1·5 h.p., s.c. water-pump motor, was fed from the alternator output. Each unit of the a.c. load was arranged to be automatically switched "on" or "off" according to a predetermined sequence of priority, such that total consumption at any particular instant matched the rated wind generator output for the particular wind speed prevailing.

Main heating was provided by 11 tubular units, distributed among living rooms and bedrooms, and having a total installed rating of 5·36 kW. These, together with a 2·6 kW immersion heater, had single-phase supplies derived from the three-phase alternator output via a static balancer. There was, in addition, a garage block-storage heater and provision for soil-warming, which, in common with the water-pump motor, had three-phase connections. All units were controlled by individual single- or three-phase contactors.

A.C. Load-switching

To achieve equilibrium of generated output with load consumption, use was made of variations in generated voltage as a function of corresponding variations in power output potential due to wind fluctuations. These voltage variations, limited to the range 350 V to 420 V, were converted to a d.c. output and fed to a moving-coil relay controlling operation of a small geared-motor. This in turn was coupled to a camshaft actuating a series of microswitches controlling operational sequence of the load contactors. Depending upon whether generated voltage was rising or falling, so camshaft rotation was either forward or reverse, respectively, switching loads "in" or "out." The actual priority of switching could be altered to suit the needs of the householder by simple rearrangement of plug-and-socket connectors.

Although the method of control adopted involved relatively wide supply voltage variations, these were quite tolerable to the heating load. In the case of the water-pump induction motor, possible overheating due to reduced supply frequency at low generator voltages was counteracted by a corresponding reduction in motor power input.

Results of the ERA experiment showed that for the total running period of 3,726 hr, total energy consumed was 4,510 kWh. This compared favourably with the figure 4,400 kWh, which was the potential generator output estimated from records of wind speeds in the area over the same period which averaged 8·5 m.p.h. Capital cost of the installation was in the region of £1,000 to £1,500 with an interest and depreciation rate reckoned at £125/annum. Cost of electricity, therefore, worked out at around 3d/kWh.

AROUND THE TRADE

BY PEREGRIN

LIKE the Ides of March, the Budget has come and gone and I am still trying to figure out what effect it will have on my own budget. The payroll tax was the most startling announcement, particularly coming so soon after the increase in NHI and pensions contributions, and I wonder whether it may not make some employers have second thoughts about the "passengers" and the part-timers that they keep in a job. Four shillings a head per week can add up to quite a bit where the boss has been generous in outlook on the older employees. However, if he is a successful business man no doubt he can meet all the extra costs out of his surtax relief. The 10% on or off purchase tax is more of a puzzle. Of course, it may give the public furiously to think. If they buy too many refrigerators on will go the 10%, but if they hold back they may get them cheaper. It is certainly making life more of a gamble for the shopkeeper when it comes to the problem of stock. The increase in fuel oil comes at an opportune time, for I see that many of the electricity boards are increasing their charges to the consumer. The battle of oil-fired central heating versus electric underfloor heating can now go on without advantage to either side.

Retail Sales Conference

I hear that the ECA held a retail sales conference in London a week or so ago at the headquarters of the British Lighting Council and that it was not too well attended—a pity this, as I understand it had an excellent programme. Vice-president Veness was in the chair to open the meeting and introduce Mr Dennis Jones, the new ECA retail sales trainer—I presume the Retail Committee chairman was there. The theme of the conference, in Mr Jones' expert hands, was the artistic and tempting presentation of goods to the public to encourage sales but, at question time, questions from the members ranged from finance to pressure selling and even service difficulties, but not the subject within the scope of the discussion. Apparently, the message of presentation put over by Mr Jones did not get over to the listeners, although he did try to explain that finance, pressure selling and other items would be the subjects of further conferences. Either the listeners knew it all or else they have not yet realised that the subject of electrical retailing is so vast that the day has gone when everything appertaining to it can be discussed in one meeting. Mr Jones is trying to arrange frequent conferences specialising in each different aspect of the trade in turn, but I am afraid he has a hard row to hoe.

One point that apparently did get over was during a film, "A Nation of Shopkeepers," issued by the British Productivity Council. In this film an ironmonger gives an instruction to his assistant to move a batten lamp testing station—I am told the retail assembly nearly passed out. I believe one could almost hear the massed thought, "Get a qualified electrician to do the job!" The lesson of this film is that by proper assignment of counter, tills, fixture, etc., one could often serve the customers twice as easily. It is time the retailers realised that one can have frustrated assistants as well as frustrated customers, with equally disastrous results. Perhaps if Mr Jones could produce a few models with loose fittings for his listeners to play with he might get more results. Half of his listeners go to such a meeting to air their particular grievances rather than to learn what the speaker has to offer—a few toys might make them more receptive.

Mail Order Houses

Incidentally, some day the Retailers' Committee might get together to discuss factory trading and the Mail Order houses. We have been called a nation of shopkeepers and it is an understood principle in this country that rent and rates are higher for retail premises than for houses or factories and the trader is, of course, taxed on his profits. But now more and more of the public are trying to horn in on this retail trade without the expense of keeping a shop or of paying tax. In factories, in offices, in workshops and even in houses, are thousands of workers and housewives who, from a magnificent mail order catalogue, are selling goods to their friends and workmates on the weekly payment system. Some have numbered payment cards and when a particular number is drawn an article can be supplied in advance of payments—a sort of h.p. system without the blessing of the Government. Almost any article can be supplied for the house, the person, or the garden and the smaller electrical goods, shavers, irons, toasters, are high on the list. I can find no evidence of any h.p. charges, but the agents themselves receive a minimum of 10%. I am given to understand that this selling has reached such a pitch that in a corner of a factory making automatic washing machines, a kind of drapery stall is set up at which the weekly takings may be as much as £100. Another one does a roaring trade in sweets and tobacco. Of course, there are "look-outs," and taking in a bulky parcel does not excite the suspicion of the gatekeeper that taking one out would do. Defaulting payers are apparently not the headache that they are to the retailers. A whisper among workmates soon produces the required results.

Action by Retailers

I do not think that in general retailers realise what a serious menace this type of trading has become for, with few exceptions—perhaps the Inland Revenue office—there is a "trader" in every works, office, telephone exchange and even Government departments, and I am told that in one Scottish warehouse this trading reaches proportions equal to the turnover of an average retail shop in an industrial district. It is time something was done. The manufacturers will not make a move—they are only interested in selling the goods. The heads of the factories, etc., concerned will not do it—either they do not know about it or they are too afraid of upsetting their workers. Therefore, it is up to the retailers. They should get together and tell the suppliers to decide which—either the genuine retailers or the home traders. They cannot continue to have the best of both worlds.

Design for installation

USER OPINIONS AT A.S.E.E. MEETING

FOUR prominent members of the electrical industry led a discussion on the design of electrical installation material and equipment organised last week by the ASEE. Each member of the panel made an opening statement of his views on the subject, and afterwards they considered questions put from the audience.

The discussion was opened by Mr A. E. Gaster, senior engineer with a firm of consulting engineers. He advocated the amendment of IEE Regulation 315, which deals with the control of motors. He was particularly concerned about its requirement for provision of additional means of isolation when the main starter and isolator are remote from the motor. In his experience, this regulation and the somewhat similar provision in the Factories Acts was often misread to indicate the need for a main current isolator close to the motor. He thought this would be bad practice and was not the intention of the regulation.

Regulation 320B gives a similar requirement for electrode water heaters and boilers, but here "adequate means" is qualified as meaning an adjacent isolator or a locking device on the circuit-breaker. Mr Gaster was uncertain whether this permitted another possibility; a tripping switch arranged for padlocking, which he would specify in the circumstances.

Consultants wanted from manufacturers, amongst other improvements, provision of equipment having ample cabling provision and, in small components, evidence of thought of wireability and the possibility of fitting glands.

Standardisation Aspects

The second speaker was Mr R. H. Phillips, managing director of a manufacturer's installation equipment group. He gave particular attention to standards, noting that although most manufacturers made equipment to British Standards, there were instances where standards long in use had been wholly or partially amended, with no subsequent general move in the industry to ensure use of the latest specification. There was no authority to insist that the latest specification was used, and he wondered whether this was not something that needed changing, the work of the Canadian Standards Association being a case in point.

There seemed to be two schools of thought in the UK about the use of all-insulated switchgear, conduit and other material. The industry needed to decide whether, if suitable plastics were sufficiently strong for normal purposes, all equipment in the accessories class should be all-insulated.

On commercial accessories, Mr Phillips voiced the query whether a 13 A socket and switch socket was sufficient to provide for all normal domestic, commercial and industrial purposes up to 3 kW. The alternative seemed to be to perpetuate mixing other sizes of sockets in installations. He asked as well whether, the NICEIC functioning, it was thought that double-pole switching of socket-outlets could be eliminated—he considered it a "belt and braces" policy.

Motor Details

Mr C. A. M. Thornton, the next speaker, is an electrical engineer in the chemical industry. He expressed concern about the thermal protection of motors up to about 200 h.p. at 1,500 r.p.m. In recent years there had been a reduction in motor sizes for given output, and growth in the importance of each individual motor in an automated works. In consequence, the inadequacy of hit and miss methods of motor protection had been underlined. It was high time, he thought, that current-operated devices in motor starters were swept away in favour of devices operated by temperature only, built into the motor windings, and designed to shut down the motor only when an excessive temperature was reached. The question whether such devices should be normally close or normally open ought to be decided internationally at the earliest stage to avoid confusion.

Mr Thornton also spoke about motor cable boxes. With the growth of distribution systems, the MVA that could be fed into a fault in a cable box had often completely outgrown the capacity of the normal cable box to withstand it. Recent tests had demonstrated great danger to personnel in this situation. What was required was considerable strengthening of cable boxes and of the anchoring of cables in them, together with adequate means of relief of any excess pressure. Another item of equipment needing revision was industrial plugs and sockets. An English version of the international standard covering industrial plugs and sockets up to 200 A rating was urgently needed—with the exception that an English version should include designs with pins for pilot conductors.

Contractor's View

Last of the four panellists was Mr C. J. Veness, an electrical contractor. He called for particular attention to installations which could reduce expensive labour time to a minimum. Contractors could not impress upon manufacturers too seriously the problem raised by a badly designed piece of equipment which took extra effort to install or connect. Further, contractors were often concerned with maintenance as well as installation, and it was extremely important for them that in the design and development of any apparatus or equipment, maintenance should be in the forefront of the designer's mind. An example of this need which he quoted concerned slip-rings which could not be seen while a machine was operating. The machine could have been allowed to run for a longer time if some sort of visor had been fitted to permit visual inspection without shut-down.

Amongst questions subsequently discussed by members of the panel and the audience were reasons for changing fixing centres, the possibilities of double insulation in industrial equipment, delays in the preparation of new standards, and the justification or otherwise of limits placed by supply authorities on the rating of machines to be started direct-on-line.

Spondon "H," a process steam station

10 MW BACK-PRESSURE SETS INSTALLED

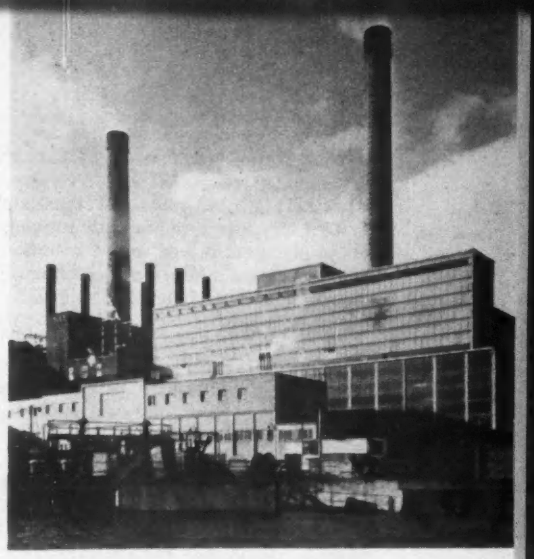


Fig. 1. Exterior view of Spondon "H" from the River Derwent

TO be able to quote an overall operating efficiency of 70% and a load factor of 80%, must surely stir the heart of any power station engineer. But these are not the only unusual facts about Spondon "H." The station is unique among those operated by the CEGB in being designed primarily as a steam-producing station—a nearby British Celanese plant uses the steam—and with back-pressure electrical generation almost an incidental. Spondon "H" has the largest water treatment plant of any of the Board's stations, even though the electrical rating is only 30·5 MW, and the dual circulation boilers are specially designed for the unusual feed conditions.

The station was officially opened last Friday by Sir Robertson King, Chairman of the Electricity Council, five years after site work commenced, the last boiler and turbine being commissioned towards the end of 1960. The station adjoins Spondon "A" and the whereabouts of stations "B" to "G" is explained by "H" denoting heat.

The station is required to supply continuously throughout the year, except for a short annual shut-down, process steam varying between 400 klb/hr and 500 klb/hr at 160 lb/sq in. 520°F. Precautions have been taken to ensure the supply through pressure reducing valves should a generating unit be out of service and if necessary, for example, in the event of a major boiler failure, a limited steam supply can also be derived from the "A" station.

Feed Water System

Since there is no condensate available, raw water equivalent to their factory's steam demand is supplied by British Celanese. The water is derived from the River Derwent, but it is heated to 125°F to 140°F in the factory. Two 70,000 gal/hr booster pumps feed the three-stage water treatment plant. The first stage comprises two hot pressure lime reaction softeners with Bailey Meters control for the lime cream dosage which is automatically proportioned to feed flow but has also overriding hand control. Each tank has a capacity of 500 klb/hr and is heated by blowdown flash steam from the boiler and auxiliary live steam to maintain a reaction vessel pressure of 5 lb/sq in. and a discharge temperature of 225°F. The partially softened water passes to a battery of eight filter beds of graded anthracite, chosen to avoid silica pick-up from the hot liquor, and then it is circulated by three 50,000 gal/hr booster pumps to three hot base-exchange Zeolite softeners. The treated water then passes to one of three deaerators.

The low level deaerators supplied with each set comprise a vent condenser and storage tank. There is also a high pressure heater. At this stage, supplementary feed heating is effected by boiler blowdown flash steam. The deaerators are connected to a common main from which feed water is extracted by six 33,000 gal/min pumps and passed to

LEADING STATION DETAILS

Boilers:

Four off dual-circulation rated	180 klb/hr.
Stop valve pressure	950 lb/sq in. g.
Stop valve temperature	895°F.
Final feed temperature	360°F.
Total heating surface	11,255 sq ft.
Primary superheater, pendant type	4,210 sq ft.
Secondary superheater, pendant type	1,510 sq ft.
Economiser; plain tube type	10,618 sq ft.
Grate drive induction regulated motors, 2/boiler	4/1 h.p.
F.D. fan motors, 415 V, 2/boiler	60 h.p.
I.D. fan motors, 3·3 kV, 2/boiler	185 h.p.
Sec. air fan motors, 415 V, 2/boiler	26 h.p.
Exhauster motors, 3·3 kV, 2 off	150 h.p.

Blowdown:

Total for four boilers	144 klb/hr.
Flash steam produced	51·25 klb/hr.
Incoming raw water temperature rise	10°F.
Total raw water heated	675 klb/hr.

Turbo-alternators:

Turbo-alternators: three off c.m.r.	10·12 MW, 11·8 kV.
Steam pressure at t.s.v.	900 lb/sq in. g.
Steam temperature at t.s.v.	875°F.
Steam pressure at turbine exhaust	160 lb/sq in. g.
Steam temperature at turbine exhaust	520°F.
Turbine stages	1+15.
Exciters: direct driven	200 V, 285 A.

Feed Water:

H.P. feed inlet temperature	250°F.
H.P. feed outlet temperature	360°F.
Feed quantity	298 klb/hr.
L.P. feed inlet temperature	220°F.
L.P. feed outlet temperature	250°F.
Feed quantity	260 klb/hr.
Electro feed pumps	4 off.
Turbo feed pumps	2 off.
Delivery head of feed pumps	1,250 lb sq in.
Feed pump s.c.i.m. rating	650 h.p., 3·3 kV.

Softening Plant:

Output of plant	765 klb/hr.
Raw water inlet temperature	125/135°F.
Treated water outlet temperature	225°F.

Main Switchgear:

33 kV, 750 MVA } single busbar	14 off.
11 kV, 350 MVA } metalclad	18 off.

Transformers:

Generator, 12·5 MVA, 33/11·6 kV	1 off.
Interbus, 12·5 MVA, 33/11·6 kV	2 off.
Station, 5 MVA, 11·6 or 6·6 kV/3·3 kV	2 off.
Boiler auxiliaries, 0·4 MVA, 3·3 kV/433 V	4 off.
Other auxiliaries, 0·75 MVA, 3·3kV/433 V	2 off.
Treatment plant auxiliaries, 0·2 MVA, 3·3 kV/433 V	2 off.

a feed pump intake main. There are six boiler feed pumps, each rated 300 klb/hr. Four of the pumps are electrically driven while the remaining two are driven by back-pressure turbines with automatic start-up control. These pumps also feed into a common main from which the boiler feed heaters and economisers associated with each of the four boilers are supplied.

Dual Circulation Boilers

Each boiler has three drums and dual natural circulation. Water from the economiser enters the primary front drum and is fed to the front, rear and sides of the furnace. Since this part of the furnace is in the radiant zone, it is important to prevent silica and solids being deposited in this section. This is achieved by maintaining from the primary drum to the secondary steam drum a continuous blowdown which also provides the secondary circuit feed. In this way, the front circuit is maintained at a relatively low solid concentration. Steam generated in the rear section enters a separate compartment in the primary drum where it serves to raise the temperature of the incoming feed water. There is no carry-over of deposits in this steam path. The blowdown from the primary section passes to the secondary, or rear convection, section of the boiler. To prevent the accumulation of solids in this section a continuous blowdown of up to 20% evaporative capacity is maintained which passes to the blowdown flash vessel, then through a heat-exchanger to waste. By using the dual circulation system, boiler blowdown can be restricted to 20%, whereas a single circulation would require a 30% to 35% blowdown to prevent excessive solid accumulation.

Steam temperature is controlled by condensing a small proportion of the saturated steam, before its entry to the superheater. This moisture mixes with the ingoing steam to the superheater and, by absorbing latent heat, reduces the overall steam temperature to the required value. A control condenser, consisting of a shell-and-tube heat-exchanger, provides the necessary condensate and is cooled by water from the main feed system.

The boiler steam enters a 12 in. steam header, common to the three turbines, the three pressure reducing valves and primary de-superheaters.

The boilers have chain-grate stokers, selected in preference to p.f. firing, both for their convenience for the size of installation and because operators in the "A" station were accustomed to them. Ash from the stoker falls through a hopper on to a submerged ash conveyor from whence it is taken to ash discharge storage bunkers.

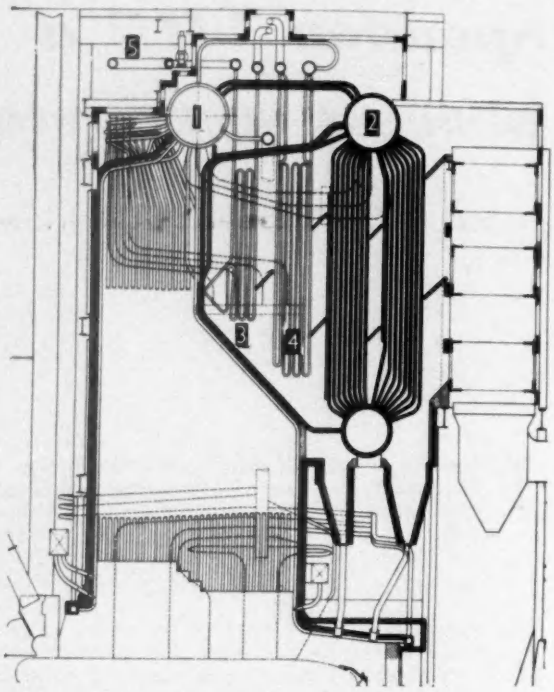


Fig. 3. Simplified section through the dual circulation boiler. 1, primary drum; 2, secondary drum; 3 and 4, primary and secondary superheaters; 5, steam main

Dust is extracted from the boiler hoppers, economisers and air heater hoppers, and from the grit arresters by suction and discharged to a storage bunker. Combustion air is drawn from the top of the boiler house by f.d. fans with inlet vane control and passed to a rotary air heater. The i.d. fans are driven by 750/300 r.p.m. motors, controlled by induction regulators. Secondary air is drawn from the front dust hopper or from the primary air ducting by fans driven by constant speed motors, and enters the furnace through nozzles in the front and rear walls. Electrical interlocking ensures that if the i.d. fans should stop, the f.d. and secondary air fans also shut down and the boiler reverts to natural draught control through the dampers.

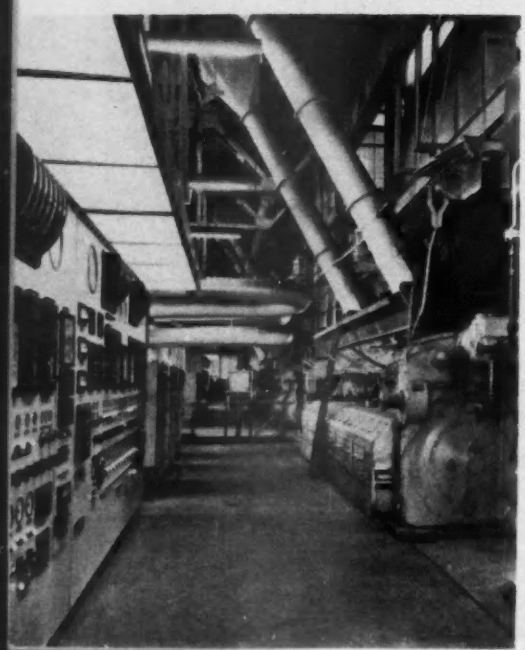


Fig. 2. The boiler firing aisle showing the control panel and chain grate stokers

Turbo-alternators

The three back-pressure turbo-alternators are each designed to pass out 205 klb/hr of process steam. Each set consists of a single-cylinder, impulse turbine directly coupled to an alternator rated 10·12 MW at 0·8 p.f. lagging. The sets can be put on the bars in 2¼ hours from cold and loaded in 20 minutes. Heat is extracted from the machines by closed-circuit air system with circulation by rotor fans and which incorporates water coolers. Excitation is provided by a single direct-driven machine, unusual in having a faceplate commutator.

Back-pressure Steam Control

Exhaust steam from the turbines passes through a 16 in. pipe to one of two, parallel, 21 in. back-pressure mains, then through secondary de-superheaters before joining the 30 in. outgoing main to the factory. Spray water for the de-superheaters is obtained under normal operating conditions from the feed heater flash vessels,

and is injected by three pumps rated 36,900 gal/hr against a head of 884 ft.

If a turbine trips or is shut down, the steam supply is maintained, through three pressure-reducing valves and primary de-superheaters, from the boiler steam main.

With the turbine in operation the pressure-reducing valve and primary de-superheater are adjusted to pass the steam under the same conditions as the turbine, but they are prevented from operating by isolating valves. If a turbine trips, the isolating valves open and steam supply can be restored to the mains through the reducing valves in about nine seconds. Automatic control of back-pressure steam is provided with either turbines or pressure-reducing valves in circuit. In the event of a boiler failure, an emergency steam supply of 100 klb/hr can be obtained from the Spondon "A" station through similar pressure-reducing and de-superheating equipment.

Control and Switchgear

The four boilers are controlled from grouped control panels on the firing floor. The main control room contains a central panel with comprehensive instrumentation of the steam and water flow, and side panels for recording and control of the turbo-alternator operation. The central mimic diagram of steam and water flow is controlled by telemetering equipment and, in addition, two recorder panels show the more important conditions for water and steam. Facing the panels is an annunciator desk which gives the operator warning of any abnormalities in the system.

The main 33 kV switchgear is indoor metalclad, single vertical busbar isolation type with current ratings of 400 A, 800 A and 1,200 A. One alternator is directly connected through a 33/11 kV transformer to the 33 kV switchgear, while the other two are connected directly to the 11 kV switchgear.

The station auxiliary system consists of 3·3 kV 150 MVA airbreak withdrawable gear and, for motors up to 150 h.p. rating, 415 V contactor control gear.

There are two inter-bus transformers and a single generator transformer rated 12·5 MVA. These transformers have on-load tap changing gear. The two 5 MVA station transformers have off-load tap changing gear. A third 5 MVA transformer is available to provide emergency supplies from the "A" station if required.

Spondon "H" is built adjoining the "A" station and includes administrative offices, chemical laboratories and a canteen. The main building is steel-framed with brick cladding to a height of 25 ft and, above this level, asbestos cement sheeting and glazing. The station was designed by the CEGB Midlands Project Group in conjunction with the architects, Messrs Cecil Howitt and Ptnrs.

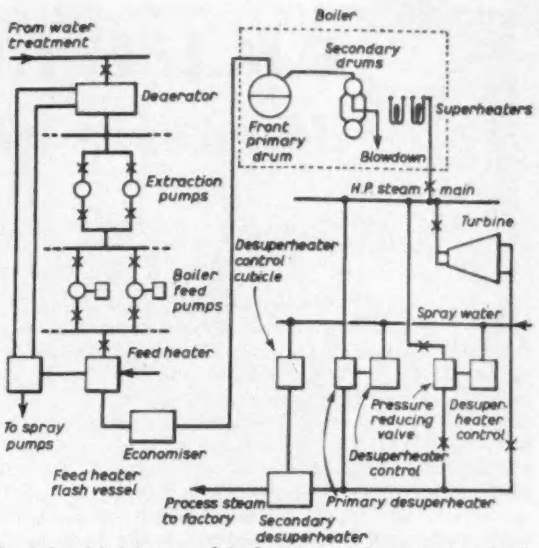


Fig. 4. Simplified diagram of the feed water and steam system showing one boiler and turbine only. Water and steam mains are common to the three machines and four boilers

Principal Contractors and Sub-contractors.

Circulating water system, building superstructure, site clearance, foundations and rail sidings	Gerrard and Sons.
Structural steelwork	Edward Wood.
Chimney	Tileman.
Boiler plant	Foster Wheeler.
Air heaters and draught plant	Howden.
Valves	Dewrance.
Instruments and controls	James Gordon.
Turbo-alternators, supervisory instruments, auxiliary motors and feed-heating equipment	AEI.
Feed pumps	Mather and Platt.
Feed h.p. and pressure-reducing valves	Hopkinsons.
Boiler feed pumps	Sulzer Bros. (London) Ltd.
Feed pump turbines	G. and J. Weir.
Auxiliary motors	LSE and LDC.
Auxiliary pumps	Gwynnes Pumps.
Coal handling plant	Int. Combustion Products.
Ash handling plant	John Thompson Conveyor.
Dust handling plant	John Thompson In. Construction.
H.P., l.p. and b.p. steam pipework and valves	Aiton.
Instruments and controls	Elliott Bros. (London).
33 kV reactors	AEI.
33 kV switchgear	Cooke and Ferguson.
11 kV swgr. and aux. tfrs.	South Wales Switchgear.
3·3 kV switchgear	Reyrolle.
Gen, interbus and other tfrs.	Brush.
Annunciator equipment	STC.
415 V contactor control gear	Contactor Switchgear.
415 V switchgear	English Electric.
Metering	Chamberlain and Hookham.
Cabling and earthing gear	BICC.
Batteries	DP Battery.
Water treatment plant	Permutit.

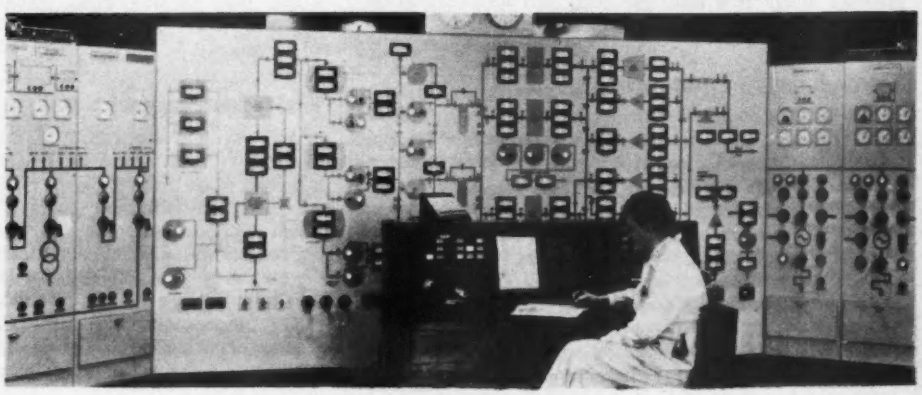


Fig. 5. The central control panel consists of a comprehensive mimic diagram of the boiler and feed circulatory system. The two side panels show the turbo-alternator controls

E.D.A./E.A.W. Conference discusses selling

GERMAN APPLIANCE TRENDS DESCRIBED IN HASLETT LECTURE

AUTOMATIC cooking in West Germany is still in its early infancy and viewed with mild disfavour by German housewives. That was the opinion formed by Miss E. M. Ashburn, senior demonstrator North West EB, after a two-month stay in the country. She spoke on her views whilst giving the Caroline Haslett Memorial lecture to the annual conference of electrical housecraft advisers and senior demonstrators organised by EDA and EAW at Harrogate last week. During the convention, papers on subjects ranging from the demonstrator's approach to schools and how to sell home laundry equipment were presented and discussed.

German cookers are unattractive in comparison with their British counterparts, said Miss Ashburn. They are more solid than UK models, but designed to suit German requirements, which differ from those of this country. The hob, which is in many cases time-controlled, is used more than the oven but, as few housewives go out to work, time-controlled cooking is only just being developed and is not finding much favour among demonstrators, some of whom try to discourage sales. However, the use of time-controlled cooking will develop as the number of women going out to work increases. Many cookers designated "automatic" will only switch the oven off at a predetermined time; it has to be switched on manually.

Hotplates are of similar design to Jackson Speedrings and Creda Quick Discs, they have 2 kW loadings and are at full power for eight minutes before being dropped to 1,200 W. Hob design is virtually the same as in some British models, the hot plates being sealed in a recessed hob. Simmerstats and radiant plates are not in general use. Normally, ovens have top and bottom heating elements both controlled by a thermostat; some of them incorporate grills and all have drop doors with inset ventilators. Grilling is a comparatively new innovation in Germany and the British cookers, with their grills at varying levels—dependent on the model—are finding favour. Catering for the flat dweller, one small cooker has the oven at the top and underneath a draw-out tray containing the hotplates. It can be used on a table or special stand. Another design is a sink unit with two hotplates at one end of the drainer and a refrigerator underneath.

Home-laundry Equipment

The erection of large blocks of flats with only one communal washing kitchen, which inhabitants can use only once a month, has led many flat dwellers to buy washing machines for use in their own kitchens. These are "beautifully designed with pleasing lines." The majority are termed automatic, a terminology which covers the smaller semi-automatic machine to the larger fully automated unit, and all have revolving drums into which clothes are placed either from the front or from the top. Washing action is carried out by tumbling clothes in the water. Capacity varies from 6 lb to 12 lb dry clothes. All machines have heaters, which are extensively used, and there is always some form of temperature control. Washing period for a white wash, including the time taken to heat water to 180°F, is about 90 min. One unit has a series of punched, coloured metal plates fed into it, each plate representing a different washing cycle.

Drying is, in many cases, carried out in the machine, but spin-dryers are also used in conjunction with semi-automatic washing units. In some places the old method of hanging clothes in an attic, where they are dried in air from open windows, is used.

Germans Use More 'Fridges

Refrigerators are in more general use among German families, possibly because of lower prices or because of a greater sense of health consciousness. Design is similar to British models, some with table tops, others taller. There are a greater proportion of home-freezers and great use is made of these appliances in a country where commercial deep-frozen food is available but does not enjoy the same popularity as in Britain. In some villages, communal deep-freezers are to be seen. In these, villagers rent lockers or make a contribution to the overall cost and are allotted storage space commensurate with their contribution. They also pay an annual amount for running and maintenance costs. Home deep-freezers vary in size from 10 cu ft to 35 cu ft and are obtainable as either upright or horizontal models.

Food Mixers and Space Heaters

On the whole, German people pay considerable attention to food values and preparation. This is clearly shown by the number of domestic mixing machines sold. Most of the mixers have only three-speed switches and are sold with a liquidiser as part of the basic equipment, although a wide range of other accessories are available.

Electrical space heating is not as widely favoured as in this country as homes are generally centrally heated by coal or oil, but electric block-storage heaters are in use in some factories, offices and schools. Floor-warming is not used to any great extent, possibly due to the extremely cold external temperature and the high temperature demands by the Germans indoors—about 75°F.

Water-heating and Small Appliances

Water-heaters are mainly of the storage type and vary in capacity from just over 3 gal to more than 22 gal. Loadings range from 3 kW to 6 kW. Instantaneous heaters are in the minority, but there is one loaded to 18 kW which is unpopular because there have been failures.

Even in the newest flats there are no waste disposal units as they seem unpopular with the authorities. Rotary ironers are in greater use and an Eltron heater and electrically heated pan seem to have ousted kettles. The popularity of coffee in Germany has given rise to a large variety of coffee mills, percolators and machines.

ASPECTS OF DEMONSTRATORS' WORK

The versatility of demonstrators in selling new appliances, co-operating with domestic teaching staffs and giving advice on home lighting arrangements were the main subjects of the papers presented to delegates.

Efficient domestic appliances used by hundreds of school children are excellent long-term advertisements. For this reason, the work of demonstrators in connection with school curricula is extremely important for the future of the electrical industry, said Miss R. A. Licence, SEEB. Another opinion was voiced by Miss D. M. Findon, SWEB, who thought demonstrators should quickly establish good relations with domestic teaching staffs so that when help, advice, or equipment was required it was accomplished by direct contact. The view of schools was stated by Miss M. J. Gordon, Godolphin and Latymer, who said demonstrators could assist teaching staffs in two ways. This could be passive, in arranging visits to the showrooms or staging demonstrations; or it could be active by giving help to inexperienced staff and also preparing pupils for examinations in the field of domestic science.

Selling Techniques

Part of a demonstrator's job was to assist in selling and there was much work to be done in opening markets for new appliances such as dishwashers, said Mr Michael Colston, of Charles Colston Ltd. The average person did not want to part lightly with £50 to £100 for an appliance about which they knew very little, therefore dishwashers had to be demonstrated before they could be sold. For sales to be effected the retailer must have stock and be prepared to display. Displays should feature a full load of crockery to emphasise amenities provided by the appliance and show the "family size" capacity of even the most compact machines.

Home-freezers, too, presented a wide market where demonstration was invaluable, said Miss Ann Smith, of Frigidaire Ltd. She urged delegates to "ride the band wagon of success" in this market. A well-stocked freezer in showrooms was the best display for this appliance, which had industrial, commercial and hospital possibilities.

Problems presented by selling back-bar catering equipment were complex, said Mr E. Briggs, NWEB. One of the difficulties was the scarcity of cooks and chefs with commercial electric cooking experience, and another was sometimes the unwillingness of these people to change from gas.

Inadequate Home Lighting

Demonstrators should be prepared to give a home lighting design service similar to that operated by wallpaper and paint manufacturers in giving advice on room decoration. Home lighting in this country left a lot to be desired, and comparison with America indicates that Great Britain lagged far behind. This opinion was expressed by Mr A. Wilcock, British Lighting Council. Comparison between present-day and pre-war British practice was unflattering in that the position had hardly altered over the last 20 years.

He contended that the answer to home lighting development lay in the ring-circuit system. If the electrical industry were to take advantage of the opportunities for this development it had to advocate the ring-circuit wiring system and convince householders that electricity and electric lighting in particular were cheap.

Mr T. E. Daniel, NWEB chairman, opening the conference. Centre, Miss M. George, EAW, and right, Mr J. A. Stedman, EDA

Future of the Kitchen

Speaking on the future of the kitchen, Mr A. L. Osborne, EDA, said the traditional kitchen was being broken up. This was due to changing domestic habits where more wives went out to work; the higher cost of building, resulting in redesigned kitchens; and the practice of having meals in the kitchen. Electrical appliance design was showing a remarkable state of fluidity in which the plinth type cooker was breaking up into its component parts—separate oven and cooking hob. There was a marked tendency for larger refrigerators to be replaced by two smaller ones, whereas home-laundry equipment tended to be "twinned" through combined washing machine/spin-dryer. The result? An urgent need for reappraisal of all aspects of kitchen design and planning.

The effect on various fabrics of different types of washing machines, wringers, spin- and tumbler-dryers were discussed by Miss J. Whitgift, Simplex; Miss C. Shirley, English Electric; and Mrs M. Pickford, EAW. Turning briefly to the aspect of selling, Mrs Pickford contended that the development of home-laundry was bound so closely to social and economic development that the ideal saleswoman needed to be a sociologist as well as a demonstrator. On the other hand, Miss Shirley said the selling point of washing machines was emphasis on the degree of convenience, and Miss Whitgift stated that users did not know what they wanted when they came to buy dryers, and demonstrators must assist them in buying the right type of machine for their requirements.

Aids for Salesmen

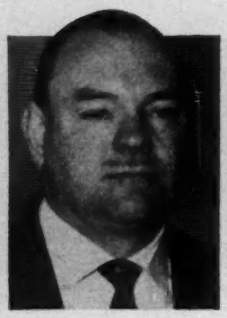
One of the greatest problems of the manufacturer was to find out what to manufacture, when and at what price, said Mr A. Mackenzie Parkinson, BEAMA, speaking on the part played by manufacturers.

One of the most important things they did besides assisting salesmen by means of national advertising, was to provide efficient servicing facilities for their products. He was supported by Mr J. C. Wood and Mr T. Machell.

The work done by EDA to assist saleswomen was outlined by Mr J. A. Stedman, who said that currently advertising campaigns were being run stressing the advantages of electricity in cooking, water-heating, refrigeration and other general domestic uses.

Personalities *in the industry*

Mr L. A. E. Fosbrooke



Mr S. A. Hunter

Mr J. A. P. Firth

Mr M. D. Lippold

Mr P. Huggins

Chief generation engineer (operation) to the Midlands Division of the CEGB since 1958, **Mr L. A. E. Fosbrooke,** B.SC.(ENG.), M.I.E.E., M.I.MECH.E., has been appointed to the new position of Regional services engineer to the Midlands Region (*ESH, page 66). Earlier, Mr Fosbrooke was a generation engineer (operation) with the Midlands Division from 1950, after being station superintendent at Brighton "A" power station for four years, and holding a similar position at Blackburn Meadows for two years. He had previously served at Deptford East, Battersea, Littlebrook, Fulham, Brighton and Deptford power stations.

Sales manager of Foster Transformers Ltd., since 1958, **Mr S. A. Hunter,** A.M.I.E.E., has been appointed to the board as sales director. Educated at Foyle College, Londonderry, and the College of Technology, Birmingham, where later he was a lecturer from 1940-44, Mr Hunter joined Foster Transformers as Midlands manager in 1946 and was appointed sales manager in 1958. Since 1950 he has been a governor of the College of Advanced Technology, Birmingham.

Manager of the Solihull district of the Midlands Electricity Board for the past year, **Mr J. A. P. Firth,** M.I.E.E., F.R.S.A., is to take over the managership of the Board's Birmingham South East District, in succession to **Mr L. Harvey,** M.I.E.E., who has been appointed manager of the Birmingham South West District, as we earlier reported (*ESH, page 125). Educated at Emmanuel School, London, and at Northampton Engineering College, Mr Firth served his apprenticeship with the Igranic Electric Co., the Foster Transformer Co., and the Fulham Borough Electricity Department. In 1936 he became assistant engineer with the Northmet Power Co., moving in 1942 to Luton Electricity Department as assistant engineer (contracts). From 1945 to 1948 he was on the engineering staff of the North West Midlands Joint Electricity Authority. He was appointed manager of the MEB's Stoke South East District in 1949, manager of the Leek District in 1953, and at Solihull in May, 1960.

A director of Holland Electrical Installations Ltd. and other concerns, **Mr A. Lealand** has been elected an alderman of Boston Town Council, of which he has been a member for 13 years.

Mr H. H. Leeming has been appointed executive director-engineering and **Mr H. P. Cadario** as director of engineering to the Hydro-Electric Power Commission of Ontario. In the new post, Mr Leeming assumes the duties formerly performed by **Mr F. H. Chandler,** who has retired after 43 years' service with the Commission. For the past four years Mr Leeming has been director of engineering to the Commission, and Mr Cadario has been assistant director of engineering.

Formerly with AEI Lamp and Lighting Ltd., **Mr M. D. Lippold** has been appointed southern area manager for Benjamin Electric Ltd. He started his career in the industry with Ekco Ensign Electric Ltd., as personal assistant to the southern area sales manager in 1953. The following year he joined Siemens Electric Lamps and Supplies Ltd. as general sales representative covering the county of Kent, being transferred in 1956 to their Reading branch and covering the area of Oxfordshire and Berkshire. Subsequently Mr Lippold became lighting engineer for the southern area of AEI (Woolwich) and in October, 1960, was transferred to the southern regional offices of the AEI Lamp and Lighting Co. Ltd. and was responsible for the handling of special large projects in the region, at the same time specialising in the paper mills in Kent.

Chief engineer with Lancashire Dynamo and Crypto Ltd. since 1950, **Mr P. Huggins,** M.I.E.E., has been appointed to the board as technical director. Mr Huggins served his apprenticeship with Crompton Parkinson and joined the Brush Electrical Engineering Co. in the early 1920's as a senior electrical designer. He later served with the British Jeffrey Diamond Co. at Wakefield and the Royce Crane Co. at Manchester before joining Lancashire Dynamo and Crypto as a senior electrical designer in 1928. He became chief designer in 1945 and chief engineer five years later.

Mr R. I. Kinross, M.I.E.E., of Rediffusion Engineers Ltd., has been re-elected president of the Society of Relay Engineers, with **Mr R. P. Gabriel,** M.I.E.E., A.M.BRIT.I.R.E., of Rediffusion Ltd., again as vice-president.

At present senior lecturer in radio engineering at Borough Polytechnic, **Mr S. N. Ray,** M.SC., B.SC.(ENG.), M.I.E.E., has been promoted to principal lecturer in the Department of Electrical Engineering and Physics as from 1 Sept. next.

The Electrical Research Association announces that the composition of Divisional Committee No. 1—Insulating Materials, is as follows: **Dr L. G. Brazier,** chairman (BICC); **Mr R. F. Archer** (Micanite and Insulators Co. Ltd.); **Dr J. S. Forrest** (CEGB); **Mr V. J. Francis** (GEC); **Mr J. D. Nicholson** (Yorkshire Electricity Board); **Mr M. E. Peplow** (CEGB); **Mr W. Reddish** (ICI Ltd.); **Mr E. H. Reynolds** (BICC); **Mr T. R. Scott** (Standard Telecommunications Labs. Ltd.); **Mr H. Willott Taylor** (Southern Electricity Board); **Mr G. H. Thornley**

** Denotes revision to the "Electricity Supply Handbook, 1961."*

Mr R. M. Fairfield

Mr W. L. Mather

Mr K. Rowell

(Castrol Industrial Ltd.); and **Mr L. H. Welch** (London Electricity Board). **Dr H. G. Taylor,** director of the ERA, is an *ex officio* member of the Committee and the secretary is **Mr G. A. W. Taylor,** of the Association.

The Council of BEAMA for the year 1961-62 includes several members who will be serving for the first time and, in addition, brings back to the Council in the new office of counsellor a number of prominent figures in the industry who have previously held the office of president or chairman. The new counsellors are: **Lord Chandos** (of AEI), **Lord Nelson** (of English Electric Co.), **Sir Vincent de Ferranti** (Ferranti Ltd.), **Mr W. K. G. Allen** (W. H. Allen Sons and Co.) and **Mr J. O. Knowles** (Metal Industries Ltd.). Other new members are: **Mr E. B. Banks** (English Electric Co.), **Mr R. M. Fairfield** (BICC), **Sir Joseph Lockwood** (EMI), **Mr W. L. Mather** (Mather and Platt), **Mr J. D. Morton** (Siemens Schuckert (GB) Ltd.), **Mr K. Rowell** (W. H. Allen Sons and Co.) and **Sir Charles Westlake** (Metal Industries Ltd.).

Mr N. M. Miskin, M.A.(OXON.), has been appointed legal adviser to the British Electrical and Allied Manufacturers' Association as from 1 May, in succession to **Mr K. F. A. Johnston.** Mr Miskin is at present with the Federation of British Industries.

Mr H. K. Hartley has been appointed general sales manager of Fawcett Preston and Co., a member of the Metal Industries Group. He has been with Fawcett Preston since 1940, starting as an apprentice and progressing through the various departments to sales engineer. He was appointed sales manager of the rubber and plastics division in April, 1960.

Wayne Kerr Laboratories Ltd. have appointed **Mr G. Miller,** B.SC., as home sales manager. He joined the company two years ago as sales engineer for the North of England. He studied electronics at Manchester College of Technology and was a graduate in physics at Swansea University. He subsequently became a circuit design engineer and spent two years as head of the Ferranti Standards Laboratory at their Wythenshawe laboratories.

As we briefly noted last week, **Mr D. J. Cole,** B.A., LL.B., has been appointed to the board of directors of E. K. Cole Ltd. Son of the founder and chairman of the company, he was educated at Oundle and at Jesus College, Cambridge, where he held a scholarship in history. He joined E. K. Cole Ltd. in 1954 and subsequently spent 18 months with an associate company in Australia, and has visited Ekco associates and distributors throughout Asia and Europe. Since 1958 he has been concerned with market research in Europe in relation to the Common Market and Free Trade Areas.

Prof P. M. S. Blackett, M.A., F.R.S., has been appointed Pro Rector of the Imperial College of Science and Technology as from 1 Oct. next. Among five newly elected Fellows of the College is **Mr T. G. N. Haldane,** M.A., M.I.C.E., M.I.E.E., F.AM.I.E.E., who is a member of the governing body, and consultant to Merz and McLellan.

Mr W. J. Vaughton, deputy managing director of the Delta Metal Co. Ltd. and managing director of James Booth Aluminium Co. Ltd., has this week flown to Brazil on the first leg of a world tour of 11 countries. He is expected to return to England on 1 July.

Assistant managing director (overseas) of the British Aluminium Co. Ltd., **Mr G. W. Lacey,** C.B.E., B.SC., F.R.I.C., has been elected president of the Aluminium Development Association for 1961-62. **Mr W. Brining,** F.C.A., of the Almin Group, becomes vice-president.

Manager of Cobra Wood Treatment Ltd., **Mr S. H. Reece** has been appointed a director.

In the formation of Ekco Heating and Electrical Ltd., to which we referred last week, in addition to **Mr W. M. York** as chairman, and **Mr C. B. Cleland** as director and general manager, the other directors are: **Mr A. J. Brunker, Mr S. A. Clodd** and **Mr E. Walley.**

Mr Paul Gotley has joined the board of directors of Electrical Remote Control Co. Ltd.

Public lighting engineer to Paisley Corporation, **Mr J. Wilson** has been elected president of the Scottish Section of the Association of Public Lighting Engineers.

Mr D. J. Anelli has been appointed export manager of Geo. Salter and Co. Ltd. in succession to **Mr C. P. Turnbull,** who has taken up another appointment.

Mr H. T. Chapman, C.B.E., F.R.AE.S., M.I.MECH.E., has resigned his appointment as deputy chairman of Bristol Siddeley Engines Ltd., but retains his seat on the board. He becomes chief executive of Hawker Siddeley Industries Ltd. as from 1 May.

Mr J. A. Savory has been appointed superintendent of the Richard L. Hearn thermal power station of the Hydro-Electric Power Commission of Ontario, in succession to **Mr E. D. Holdup,** M.SC.(ENG.), A.M.I.MECH.E., A.M.I.E.E., whose promotion to take charge of the Commission's Lakeview generating station we reported on 23 March. Mr Savory was previously maintenance superintendent at the Richard L. Hearn station.

Mr F. A. Bartlam has been appointed general manager of the Cheltenham branch of R. A. Poole Ltd. Prior to Dec., 1959, when he resigned, owing to temporary ill health, Mr Bartlam was a director and secretary of Electrical Trades Supply Ltd. of Birmingham. For nine years he was secretary of the Midland section of the Electrical Whole-

Sir Charles Westlake

Mr N. M. Miskin

Mr D. J. Cole

salers Federation. He has been national chairman of the Electrical Trades Commercial Travellers Association and for two years was chairman of the Birmingham branch of the EIBA.

Managing director of Creed and Co. Ltd. since May, 1957, **Group Capt F. C. Daubney,** C.B.E., has been appointed chairman of the company, to succeed the late Sir Francis Brake,

Mr J. F. Muirhead has been appointed a representative in the West of London for the Lamp and Lighting Group of the south east region of Philips Electrical Ltd. **Mr R. A. Polglaye** has also been appointed as a lighting representative to the company in the north west region in succession to **Mr J. N. Davenport** who becomes a home lighting representative.

Local director and general manager of Crompton Parkinson (Doncaster) Ltd., **Mr G. R. Lewis** has been installed as president of Doncaster Engineering Society for the ensuing year.

OBITUARY

Mr E. G. Rowledge, a local director of the Pressed Steel Co. and senior director of the Prestcold Division, died on 19 April, aged 62. He was chairman of the Domestic Refrigerator Development Committee, DoRDeC, and past chairman of British Refrigeration Association.

Mr E. L. Bishop, managing director of Deritend Engineering Co. Ltd., died on 21 April.

Mr A. W. Barford, manager of the African area of AEI Export Co. since 1959, died on 19 April, aged 56. He started as an apprentice with the BTH Co., and after a period with the Construction Department in London, and RCA Photophone Ltd., he served at Newcastle. After war service he was a commercial engineer with BTH London district, and in 1955 was appointed manager, Eastern sales, for the BTH Export Co.

NEW LITERATURE

Dictionary of Electronics

by H. Carter, A.M.I.E.E.

A HANDY reference for engineers and technical authors, this volume lists and defines terminology relating to electronics fundamentals and their practical applications in a generalised field. Sketches and circuit diagrams illustrate the explanations where appropriate and, to simplify cross referencing, key words are printed in capital letters. The text also includes a series of useful appendices giving conversion tables, circuit symbols, abbreviations and similar information. Published by George Newnes Ltd., 377 pages, 5 in. by 7½ in. Price 35s net.

Low Frequency Amplifiers

by A. Schure

THIS little volume comprises two of seven booklets on electron technology produced for the New York Institute of Technology and edited by Alexander Schure. The first deals with principles of amplification and the fundamentals of design of low frequency voltage amplifiers, single ended and push-pull power amplifiers and the basic principles of transistor amplifiers. The second expands the study by discussing coupling methods, phase inversion and feedback and the design of vacuum tube and transistor amplifier systems. The two books together make a useful and practical approach to amplifier design for the student, who will find the text easy to read and the diagrams clear and understandable. Published by Chapman and Hall, 77 pages and 67 pages, 8½ in. by 5½ in. Price 32s.

The Million-dollar Bend

by C. Eisler, M.E., D.SC.

THIS is the autobiography of Charles Eisler, Hungarian-born inventor and pioneer in the mass production of tungsten filament lamps and thermionic valves. After leaving his native country in the early part of the century to seek his fortune in the United States, he rose from tool draughtsman to chief engineer of the Westinghouse Co in the 'twenties and eventually set up his own business for the manufacture of lamp-making machinery. The latter venture involved legal battles with cartels in the lamp business over patent right infringements to which the author devotes two whole chapters. Though somewhat disjointed, the narrative as a whole makes interesting reading and is liberally sprinkled with anecdotes concerning the author's experiences, ranging from his boyhood in peasant Hungary to when he became a successful businessman and travelled the world. For the technically minded, the book concludes with an appendix which gives details of some of the 55 patents relating to lamp and valve making machinery for which the author was responsible. Published by The William-Frederick Press, New York, 306 pages, 5¾ in. by 8¾ in. Price $4·75.

British Journal Photographic Almanac, 1961

AN extensive section on colour photography technique and another on electronic flash techniques are features of this annual, which provides a wealth of information for the keen photographer, both amateur and professional. Conforming to previous pattern, 67 pages are devoted to reviews of new apparatus and materials, while all the regular tabular data is retained. Published by Henry Greenwood and Co., 596 pages, 7½ in. by 4¾ in. Price 8s.

Basic Ultrasonics

by C. Glickstein

THE literature on applied ultrasonics is, unfortunately, more sparse than could be wished and this book treats the subject from a strictly practical viewpoint with admirable clarity and dispatch. The first part deals with the general theory and shows how the sound waves, at frequencies between 16,000 c/s and 5 Mc/s, are generated and applied for various purposes. The second part deals with types of generator, from the purely mechanical to the piezoelectric crystal and magnetostrictive types, and the associated equipment. The final part covers applications and clearly discriminates between cavitation and echo-ranging types of usage with respective frequency ranges.

The book is profusely illustrated with the line and tint type of diagram extensively used in American primary level technical literature and there is a selection of questions and problems at the end of each part. Published by Chapman and Hall, 133 pages, 9¼ in. by 6 in. Price 32s.

An Introduction to Electrotechnology

by S. J. Kowalski

ONE more addition to the extensive range of textbooks for the student of electrotechnology, this is again based upon an author's notes for lectures which he gave to students at the Polish University College, London, between 1948 and 1953. Covering approximately the requirements for part 1, Applied Electricity, for the London B.Sc., it is presented in a clear and readable fashion with many line diagrams and a proper proportion of mathematics. Published by Chapman and Hall, 294 pages, 8½ in. by 5¼ in. Price 35s.

BOOKS RECEIVED

Television Receiver Servicing, Volume 1, by E. A. W. Spreadbury. Detailed discussion of servicing techniques related to power based circuits. Published by Iliffe Books Ltd., 364 pages, 8½ in. by 5½ in. Second edition, price 25s.

Modern Wiring Practice, by W. E. Steward. Concise guide to installation practice with reference to 13th edition of IEE regulations. Published by George Newnes Ltd., 228 pages, 8¼ in. by 6 in. Fifth edition, price 25s.

Wires and R.F. Cables, by G. W. A. Dummer and W. T. Blackland. Comparison of different materials and type of manufacturer available, together with a study of technical design. A further volume in the publishers' series on Radio and Electronic Components. Published by Pitman, 240 pages, 8½ in. by 5½ in. Price 47s 6d.

The South Wales Story of the A.M.E.M.E., by Dafydd Tomos. A year by year history of the South Wales branch of the Association of Mining Electrical and Mechanical Engineers from its formation in 1909. 44 pages, 10¼ in. by 8¼ in. Obtainable from the Secretary, AMEME, 55 Churchill Way, Cardiff. Price 5s.

Higher stress for o.f. cables?

RECORD IN SERVICE EXAMINED AT I.E.E. MEETING

OIL-FILLED high-voltage cables have been in use in supply systems since 1924. An evaluation of present design characteristics and assessment of future possibilities is given in two papers* presented last week to the IEE Supply Section. The first of the papers deals with the overall position, while the second concentrates on the effect of age and temperature on cable dielectric properties.

The authors of the first paper claim that the record of performance of o.f. cables is "almost unrivalled" for high-voltage electrical apparatus. Only one case is on record of interruption of service under normal conditions due to electrical failure. They claim the oil-filled cable is today fairly generally accepted as probably the only type known which can be used for voltages of 300 kV and above.

Design Improvements

In recent years there have been many improvements in the design of oil-filled cables. Better insulation and screening materials have been used, an improved understanding has been obtained of mechanical stress resulting from the paper lapping operation, and subsequent bonding and processing of the cable and improvements have been secured in manufacturing and processing equipment. The paper discusses these improvements in some detail, and also examines performance tests to which the cables are now subjected.

Apart from improvements in the cable itself, there has been considerable progress in jointing technique and design of cable accessories. As a result conventional materials can be used at higher stress than in the past without reduction in electric strength, while with some types of accessories the introduction of epoxy resin has permitted a radically new approach. However, the present cost of epoxy castings is high, and their use is in consequence limited to those parts of cable accessories where the unique properties of the material—including imperviousness and ability to adhere to metal surfaces—can be employed to the best advantage.

Future Possibilities

Having examined the current position in oil-filled cable design, the authors attempt an assessment of future possibilities. They seek to answer the question: can the oil-filled cable system be still further developed so that even more economic installations become possible?

Cable makers believe that further progress is possible. It is suggested there is ample scope for it in the paper and oil used for the dielectric, and also in the technique of applying papers and the processes of drying and impregnating them. Of vital interest in any scheme for improvement is the search for a low-loss, low-dielectric-constant material that can replace wood pulp paper, and thus increase the power which can be transmitted by underground cables.

The attitude of some cable users towards such development appears, in the opinion of the authors, to be less optimistic than that of cable makers. They suggest this attitude is brought about not by actual experience that more highly stressed cables fail in service more frequently, but rather by a fear that the margin of safety is being reduced too low. To this the authors reply that better understanding of the process of cable manufacture has meant more even quality in cables, which in turn justifies working to a smaller design margin. Moreover, the possibility of trouble due to mechanical considerations (implying damage due to tearing of papers during handling and installing cables) has been virtually eliminated with the most modern paper lapping techniques.

Another argument against higher stress levels alleges that the economies obtainable through using them are so small that the additional risk they represent is not worth taking. The authors consider that this runs counter to general experience in technology. Most types of apparatus are improved by painstaking small improvements producing only moderate economies at any one step.

Be this as it may, the conflict of ideas is thought to have reached the stage where users are reluctant to take advantage of the most advanced cable designs and tend to deplore further developments which might lead to higher design stresses. Most cable makers, on the other hand, are convinced there is no reason why still further advance should not be made.

Life and Loading

The second of the papers presented to the meeting describes Italian investigations into the electrical and mechanical characteristics of cable insulation in the range 60 kV to 230 kV after many years in operation. This has been backed by laboratory tests on cable models with the object of answering the question, often asked by users, how many years of life a cable will lose due to short periods of overloading. Much detail about the tests carried out is included in the paper, but results of these investigations can be summarised as follows:

(a) Paper is the cable component most affected by temperature.

(b) In the range of temperature and duration considered, the electric strength of the cable is not significantly influenced by the combined action of temperature and electric stress. A temperature as high as 120°C appears permissible for several months; if ageing is continued beyond the limit corresponding to complete loss of mechanical strength, impregnated paper undergoes a further very fast chemical decay. A maximum operating

* No. 3513: "Progress in Oil-filled Cables and Their Accessories," by A. N. Arman, PH.D., M.I.E.E., F. J. Miranda, DR ING., M.I.E.E., and G. R. Bishop (Pirelli-General Cable Works Ltd.); and No. 3348: "The Influence of Ageing on the Characteristics of Oil-filled Cable Dielectric," by P. Gazzana-Priaroggia, DR ING., A.M.I.E.E., G. L. Palandri, DR ING., A.M.I.E.E., and U. A. Pelagatti, DR CHEM. (Pirelli S.p.A., Milan).

stress of about 16 kV/mm appears to be permissible in low-pressure oil-filled cables operating at 120°C.

(c) Power factor increase with ageing is moderate and does not appear to be proportional to time or temperature.

(d) Mechanical properties of paper tapes taken from cables after more than 20 years in service are still of

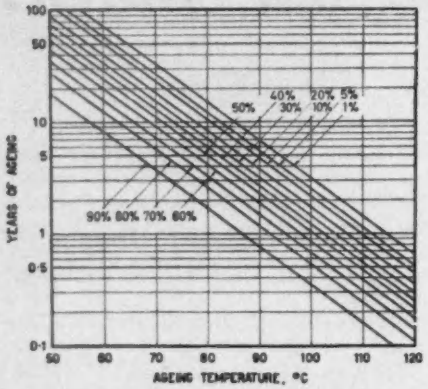


Fig. 1. Time required to reduce the mechanical strength of cable paper to various proportions of the original value, as a function of temperature. Curves of this nature can be used to estimate remaining cable life

"quite good" standard. From this it appears that cables have been operated below rated loading, and that if this level of loading continues, the cable will go on operating satisfactorily for a long period.

These results raise the question whether a higher loading should have been imposed on the cables, or alternatively, what useful life have they remaining if the load is maintained at its existing level? A reply to this question is possible if mechanical deterioration of paper is taken as the criterion. Laboratory tests have shown that, when cable insulation is not submitted to movement, even severely deteriorated papers maintain their impermeability and electric strength unchanged. Movement is effectively prevented when cables are buried direct in ground, but not when they are laid in ducts or troughs. In the latter case, a more severe limit to the amount of deterioration allowed for paper has to be fixed.

The sort of time relationship that applies is shown in Fig. 1, which is based on an estimate that a decrease of 10°C in operating temperature extends the time taken to reach a given degree of deterioration by a factor of 2·2. Provided the characteristics of the cable papers when new are known, curves, such as Fig. 1, might be used to plan for old as well as new cables, the most convenient temperatures for normal emergency loadings and their duration and frequency in relation to design life.

In the first of the papers, the overloading capabilities of oil-filled cables is discussed in relation to joints and sheath, as well as the dielectric. It is concluded that oil-filled cable systems can be subjected to conductor temperatures up to at least 110°C for considerable periods (and to higher temperatures for short periods) without measurable effect on the life of the installation.

DISCUSSION

Mr S. E. Goodall (AEI) agreed with the authors of the Italian paper that the life of a cable might be considerably enhanced if it was buried direct in the ground and the constant movement in troughs or ducts eliminated. There might, however, be movement at the ends, where it came out. The authors' conclusion that the effects of periodic overloads or changes in temperature were cumulative suggested that British cable-makers had been wise in being reluctant to accept the suggestion of the CEGB that they should consider emergency ratings for cables, periods when the cable could be used considerably in excess of its normal rating. He did not agree with the authors of the other paper on the advantages of using still higher levels of impermeability of paper, rendered possible by the introduction of new impregnating techniques.

Mr G. S. Buckingham (Midlands EB) suggested that in addition to making a cable to withstand 110°C, the authors of the Italian paper should find a device which gave the temperature of the conductor. This was a most important requirement not so far solved. He agreed with the proposal of the authors of the English paper to use aluminium sheaths, but had doubts about the effectiveness of the anti-corrosive finish which they proposed to use.

Dr A. L. Williams (BICC) emphasised the importance of ensuring in making, installing and maintaining oil-filled cables that air and moisture were absent so far as possible.

Mr R. S. Orchard (Merz and McLellan) felt it would be unwise to design h.v. oil-filled cable systems for 110°C until there was far more information than was available at present. It might be better for a code of practice to be prepared similar to that available for transformers.

Mr J. Banks (BICC) said it would be a pity if this country, which had led the world in proposing a performance specification for h.v. cable work which gave the designer fair freedom, should accept a change from this practice and the introduction of an arbitrary 24-hr test. He did not think it possible to go very high in the impermeability of paper.

Mr E. H. Ball (Pirelli-General) said that while the suggestion to increase the number of impulses applied might stagger those who organised type tests it should be quite practicable at the withstand level.

Dr C. H. Gosling (CEGB) was disappointed that there had been no mention of the strength or characteristics of o.f. cables for d.c. On the subject of overloads, he said that in London there were routes essentially laid direct, but the same size conductor was used when the cables ran in ducts for lengths of up to 50 ft. If the temperature was 85°C for the rest of the route, in the centre of the duct it would be of the order of 110°C.

Mr K. H. Tuson (Mackness and Shipley) found it depressing that no cable of over 132 kV had so far been installed in this country, apart from short lengths for experimental purposes.

Mr H. Halperin (USA), in a written communication read to the meeting, said, as the result of test data, he believed that so far as thermal properties of cable insulation were concerned it would be safe to operate in emergencies at 140°C, provided the total duration in the life of the installation did not exceed one month.

Mr J. A. Baskwell (Pirelli-General) referred to what had been said about the importance of keeping down power factor and of low residual moisture and described a method recently developed for this purpose.

Mr D. J. Skipper (CERL) disagreed with the authors of the English paper on the importance of higher operating stresses for 400 kV systems and gave reasons for his contention that in advancing the design stress of 400 kV oil-filled cable a point was reached where the savings in materials costs was increasingly offset by the detrimental effects of dielectric losses. On the basis of total annual charge, the optimum design stress for such cables was about 180 kV/cm.

Mr D. M. Cherry felt that a halt should be called to the increase of design stresses, because the yield was getting low, and they should concentrate on much more important matters such as the reduction of the losses and more perfect protective covering, in particular to allow full use to be made of aluminium.

Other speakers included Mr Mochlinski (ERA), Mr W. Holdup (Pirelli-General), Mr O. S. Johnson and Mr W. Holttum. Some of the authors replied.

Heavy current switchgear for Ffestiniog

SPECIAL DESIGN FOR PUMPED STORAGE PROJECT

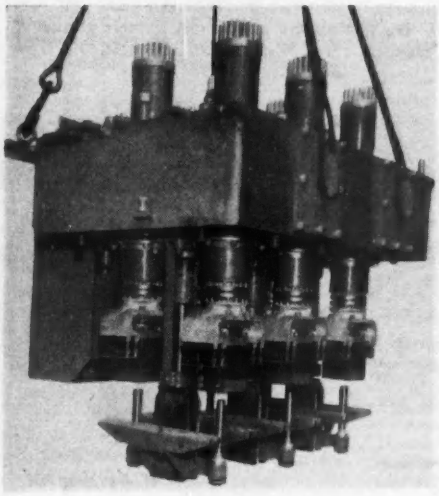
IN the modern power station it is usual practice to couple the terminals of the generator solidly to the primary of the generator-transformer and to carry out all switching on the secondary side. As a result, the demand for heavy current switchgear at generator terminal voltages is practically non-existent. Where, however, the generator also serves as a motor to drive the turbine as a pump—or a pump on the same shaft—in a pumped storage hydro-electric scheme, such as at Ffestiniog, some form of switchgear must, of necessity, be interposed between the generator and its associated transformer.

The Ffestiniog Project

The Ffestiniog project comprises four 75 kW 0·8 power factor 16 kV generators coupled to tandem turbines and pumps in two pairs feeding, through a single busbar heavy current three-panel switchboard, a 16/290 kV generator transformer and a 1,000 kVA station transformer. Each end panel incorporates a 16 kV oil circuit-breaker controlling one of the two generator/motors, the centre panel containing the protective and metering equipment.

On account of the close proximity of the circuit-breakers to the large power generation sources, their short-circuit rupturing capacities must be correspondingly high. To meet the conditions, a non-standard heavy current, high-breaking capacity, vertical-drawout circuit-breaker has been designed by the GEC for use with these particular boards.

The breakers are of the double-break type rated at 1,500 MVA rupturing capacity and with a nominal current-carrying capacity of 3,000 A at 16 kV. The main contacts comprise 24 pairs of spring-loaded fingers and associated wedge-type moving contacts per single-phase break with plug and socket arc-breaking contacts enclosed in cross-jet, deionising chambers located between the main fixed contacts.



The GEC breaker developed for Ffestiniog with the oil tank removed to show the contacts

Solenoid-operated closing mechanism, controlled from the switchboard, but with provision for remote operation, is also incorporated and a motor-driven screw hoisting and lowering gear is provided for isolating the switch from the busbars. With the breaker lowered for servicing, protective shutters close over the spouts, the lowering gear being sufficiently rigid to permit the tank to be dropped and maintenance carried out without further support.

The magnitude of the currents flowing under normal operating conditions are such as to necessitate the extensive use of non-magnetic steel and alloys to minimise eddy-current losses with consequent heating in the structural metalwork of both switch and busbar enclosures. Some of the protective current transformers have to be located on the feeder side of the breakers and suitable enclosing chambers have been mounted on the top of the busbar chamber at the rear of the panels.

With a two-way flow of current changing direction daily—for Ffestiniog is planned for use with Trawsfynydd nuclear station as base-load—the protective arrangements must serve to give protection with current flow in either direction. Any fault occurring on the 16 kV busbar system immediately trips both generator breakers and the 275 kV switchgear at the Trawsfynydd end of the line. No switchgear is provided on the high-voltage side of the station transformer but the protective system trips the m.v. breaker on the remote side of the transformer as well, where earth fault protection and back-up over-current protection are also provided.

The Switchboard

The two three-panel switchboards are each 23 ft long by 11 ft 6 in. deep and 12 ft 6 in. high. They are enclosed in a switch-house with the generator transformers outside and about 10 ft away, the 8½ in. o.d. 6,000 A tubular busbars passing through a bushing in the dividing wall. The busbar is split into three sections joined by flexible laminations to allow for expansion in an external air-insulated jointing chamber and an oil-filled internal jointing chamber. An additional oil-filled jointing chamber enclosed within the centre panel of the switchboard accommodates the copper strip connections between the 6,000 A busbars and the three 3,000 A busbars, which are also of tubular cross-section, feeding the two generator switches and the station transformer. Other instrumentation includes potential transformers for instruments, automatic voltage regulation and synchronisation, current transformers for o/c and e/l relays, "duo-bias" protection and generator circulating current protection.

The potential transformer for synchronising is a three-phase class B unit rated at 200 VA. It is a plug-in unit which is inserted into connecting sockets in a small chamber at the back of the central panel. Isolation is effected by a hand-racking device which withdraws the unit from the connecting sockets. Separate earthing arrangements are provided for each circuit-breaker and the whole system is fully interlocked to prevent mal-operation.

new products and appliances

Line sag calculator

ENGINEERS will be impressed with the quality of workmanship in a new sag calculator produced by Riley and Neate Ltd. for use in the erection of CEGB 275 kV and 132 kV lines. The calculator gives sag for 0·4 sq in. and 0·175 sq in. copper equivalent s.c.a. conductors and has been based on the latest loading conditions specified by the CEGB. It takes the form of a compact plastics-sheeted "book," 12¼ in. by 11 in. in size. Engraved on the sheets are tables on erection tensions for the two conductors, including the accepted increase in tension to allow for permanent extension of the conductor after erection. The calculator takes the form of a circular slide rule, which gives erection sags direct and final sags through use of the engraved tables.

The calculator gives sags considerably more accurately than those obtained by the usual double-interpolation on a sag chart. They may be obtained within ±0·2%, equivalent to 1 in. on a sag of 42 ft. The calculator brings out the relatively great importance of temperature compared with span. For example, taking a span of 800 ft of 0·4 sq in. s.c.a. at 49°F, a decrease in temperature of 2°F produces a tension corresponding to a reduction of 90 ft in the equivalent span. *Riley and Neate Ltd., The Abbey Mill, Winchester.*

New 'fridges from Ada

FIRST new appliances from Ada (Halifax) since they were taken over by Philips Electrical six months ago are two refrigerators, 3 cu ft and 4·5 cu ft. A little more than 19 in. wide by 33 in. high, the smaller model can be either free-standing or built-in under a standard-height unit. It has a full-width shelf for storing frozen foods and space for bottles and dairy produce in the door liner. The larger model, in addition to the basic points of the 3 cu ft model, has a large salad drawer and an automatic interior light. It also incorporates a full-width freezer with a capacity of 16 lb. Of standard working height, this 'fridge is 21 in. wide and 24 in. deep. Both models are finished in cream or white enamel and have magnetic door-sealing gaskets. Prices are: 48 gn for the smaller model and 63 gn for the larger. *Ada (Halifax) Ltd., West Mount Wks, Johnson St, Halifax.*

Cooker price cuts

ON Wednesday last week GEC announced price reductions in two models of their "Treasure" cookers which came on the market last year. "Treasure 4" is reduced from £59 10s to £54 12s. It has four high-speed simmer controlled hotplates, eye level grill and automatic oven timer. The smaller model, "Treasure 3," with oven timer, is reduced by £4 15s to £47 5s and without oven timer it costs £44 2s as opposed to the old price of £48. *GEC, Magnet House, Kingsway, W.C.2.*

Tough soldering irons

FEATURE of a new range of soldering irons developed specially to suit GPO requirements and now available to industry is the incorporation of virtually unbreakable handles moulded in "Rockite," supplied by British Resin Products Ltd. The handles are hollow-moulded in two halves with an octagonal flange to protect the operative's hand and also to prevent the iron from rolling when placed on a sloping surface. Tests successfully passed by the irons include dropping from a height on to concrete and throwing down stone steps. *Wolf Electric Tools Ltd., Pioneer Wks, Hanger La, W.5.*

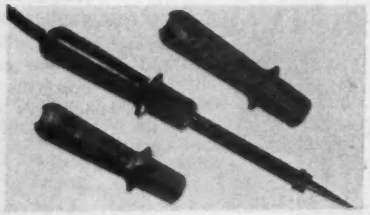
Smaller photoflash bulbs

SHORTLY after announcing photoflash bulbs so small that five fit into a matchbox, Atlas have reduced the dimensions of True-flash Type I to a diameter of 16·5 mm and a maximum overall length of 46 mm. These are being sold in a smaller six-bulb wallet containing comprehensive exposure data. *Atlas Lighting Ltd., Thorn Hse, Upper St. Martin's La, W.C.2.*

Capacitor discharge stud-welder

AMONG advantages claimed for the "KSM" capacitor discharge stud-welder, now in production in the UK, is its ability to weld on to metal sheet as thin as 22 gauge without burning or marking the underside. The equipment, handling studs from 6 BA to a maximum of ¼ in. diameter, thus lends itself particularly for use with ready finished material such as mild steel sheet with stove enamel or vinyl plastics backing. The lightweight, portable gun is connected to a capacitor bank unit having a capacitance of 100,000 μF with charging facilities to 160 V depending upon the size of stud to be welded. Automatic recharging is carried out after each operation at a maximum rate of 12 charges/minute and the equipment can be supplied from a normal single-phase 13 A socket-outlet. Specially formed studs are supplied by the makers each of which has a small pip at the base end playing an essential part in the welding operation. The stud is held in the gun and the pip placed in contact with the metal sheet which is connected to the capacitor return circuit. On pressing the trigger the capacitor discharges through the pip connection, the heavy current surge melting the stud end and corresponding metal surface. At the same instant a spring is released driving the stud forward to fuse it with the metal sheet. The process is completed in about 2 milliseconds so that the intense heat is confined to the weld. The process promises wide application in the field of light gauge metal fastening; studs and attachments formerly brazed or riveted over can now be welded quickly and simply by this means. *KSM Stud Welding Ltd., High St, Old Woking, Surrey.*

◀ *New Ada refrigerator with 4·5 cu ft capacity*



Wolf soldering iron featuring "Rockite" handle to withstand rough treatment

"KSM" stud-welding gun

Shaver has adjustable head

POPULAR in America, the Roll-a-Matic, Remington's latest model for the 1961 market, has a shaving head adjustable to suit varying types of skin and beards. The shaving surface, featuring rolling action cutters, is hand-regulated by users to suit their own particular needs. This model will be launched on 1 June and has a restyled casing. The current model, Remington 657, will stay in the range. *Remington Electric Shavers Ltd., Kensington High St, W.8.*

Swiss deep-fat fryer

SEVEN different models of a Swiss-made deep fryer are being marketed by EUK Catering Machinery, all of them incorporating an automatic oil filter, claimed to be unique. A sensitive thermostat is said to maintain oil at a constantly correct temperature. The body is of rigid steel construction finished in white vitreous enamel and mounted on a plinth. Heavy gauge stainless steel is used for the pan which is integral with the polished hob. All models are suitable for either 240 V normal or 415 V three-phase supply and control is by an on/off switch and variable thermostat. The seven models vary in capacity from 14 pt to 70 pt of oil. *EUK Catering Machinery Ltd., Oldham, Lancs.*

Silicon microwave switch

SAID to be based on an entirely new concept, a recently announced range of silicon p-n junction type microwave switches employ variable resistance diodes instead of the variable capacitance type. This feature is said to enable the switches to handle greater powers than hitherto. The devices are offered with tunable waveguide mounts to enable achievement of maximum efficiency at any particular frequency within the operating range which is covered by bands S and X. Typical characteristics of the diodes used are: diode rating 2 W, diode operating power 100 mW, switching time 0·5 microsec. *AEI Ltd., Electronic Apparatus Division, 155 Charing Cross Rd, W.C.2.*

ELECTRICAL INSTRUMENT INTRODUCTIONS

IN the field of electrical measuring instrument manufacture, recent months have seen a number of new introductions. Concerning moving-coil and moving-iron instruments, Crompton Parkinson have brought out three new types available as voltmeters or ammeters in various ranges. Although for differing applications, a common feature of these instruments is the use of 240° circular scales. The first two are for school laboratory use and class demonstration purposes, respectively. The laboratory instrument, designed to withstand rough treatment while maintaining its accuracy, is of robust construction with the incorporation of a massive magnet system and spring-mounted movement. Supplied with a moulded plastics bench mounting, and having 4½ in. scale, this compact instrument is said to give the same degree of accuracy as large industrial switchboard types. The class demonstration instrument has an 8 in. diameter dial with a 13½ in. scale which, coupled with the use of bold figuring against a clear white background, makes it easily readable at distances corresponding to the length of an average classroom. This instrument has a pressed-steel case with a circular bezel and is supplied with standard CP shunts and resistance bobbins.

The third CP instrument is a miniature panel-mounting type manufactured to Admiralty specification for use in fighting ships. It is, therefore, exceptionally robust and its durability should prove to be more than adequate for most industrial applications. Available with a 2 in. square dial and 3½ in. scale or a 2½ in. dia round dial with 4½ in. scale, it has a die-cast, nitrogen-filled case and is proof against humidity and extremes of mechanical, electrical and climatic stress.

Also for panel mounting is the new "Crystal" range of current and voltage instruments by Measuring Instruments (Pullin) Ltd. Notable feature of this range is the availability of transparent covers, each with a different coloured lower front for ease of identification when the instruments are mounted on a complicated control panel. Dials for these instruments have been designed to give clear viewing from 4½ ft, even though scale length is only 3·8 in. and external dia less than 5 in. Movements are either moving-coil or moving-iron for both a.c. and d.c. ranges.

Among recent portable electronic instruments, the "Type TF 1375" a.c. microvoltmeter announced by Marconi is fully transistorised and covers in 12 ranges voltage measurements between 5 μV and 15 V. Suitable for an input frequency range of 50 c/s to 1 Mc/s, essential features of the instrument are an input attenuator and amplifier, both frequency compensated. Amplifier output is rectified by means of a full-wave bridge circuit before being fed to a 4 in. scale meter calibrated in voltage and decibel scales and incorporating overload protection. Typical of many applications for the instrument is measurement of transformer and motor leakage flux using a suitable pick-up loop.

For measuring relatively low values of resistance, Startronic Ltd. have produced three versions of a compact bridge unit. This has a base size of only 5 in. by 7½ in. with a maximum height of 4 in. sloping to 2 in. at the front. The "Model 100" covers 0·05 ohm to 50 kilohms in five double-decade ranges with an accuracy of 0·5%, the standard resistors employed being known to better than 0·1%. Powered by an internal battery, a mirror scale null-point meter is used in conjunction with a 4 in. dia calibrated dial. The "Model 108" has a single range, having a maximum of 160 millohms, suitable for the measurement of contact and bonding resistance. The third version, "Model 110," is a comparison bridge with a standard range of 5 ohms to 10 kilohms, calibrated to read tolerances of up to ±10%.

Turning from low resistance measurement to low frequency waveform analysis, the latter is the function of a portable spectrum analyser developed by Fenlow Electronics Ltd., which can deal with frequencies as low as ½ c/s up to 1,050 c/s. This frequency range is covered by five bands with various filter widths. The instrument may be applied to the investigation of a wide range of vibration problems encountered in the engineering industry.

Crompton Parkinson Ltd., Crompton Hse, Aldwych, W.C.2.

Measuring Instruments (Pullin) Ltd., Electrin Wks, Winchester St, W.3.

Marconi Instruments Ltd., St. Albans, Herts.

Startronic Ltd., 117a Malden Rd, New Malden, Surrey.

Fenlow Electronics Ltd., Springfield La, Weybridge, Surrey.

1. Crompton Parkinson class demonstration instrument

2. Pullin voltmeter with coloured instrument cover

3. Miniature panel mounting instrument by Crompton Parkinson

4. Startronic low resistance bridge

5. Fenlow Electronics spectrum analyser

Fire-warning siren

FOR use in factories and similar premises, the recently announced "Super Siren" is said to give audible warning of fire outbreak at distances of up to half a mile in still air. Its eight-bladed impeller produces a 550 c/s note, said to be easily distinguishable from normal factory noises. Designed for long life with minimum attention, all rotating parts are carried on sealed ball-bearing journals with motor armature and field windings impregnated to withstand industrial atmospheres. The universal a.c./d.c. motor is available in standard voltage ranges between 100 V to 110 V and 230 V to 250 V, while battery-operated units can be supplied to special order. The siren is foot-mounted, weighs 10 lb and has overall dimensions of 7¼ in. dia by 7¼ in. long. *Martindale Electric Co. Ltd., 7 Westmorland Rd, N.W.9.*

Prestcold reductions

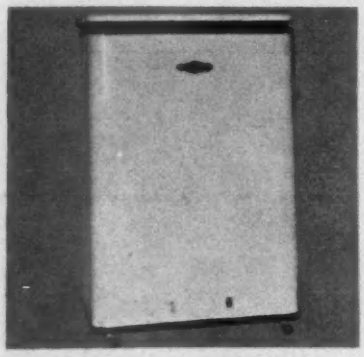
FOLLOWING a move to their new Swansea factory, Prestcold announce a cut in the price of the CC 132 commercial refrigerator with 13 cu. ft. capacity. The present price of £129 10s is a reduction of nearly £10 on the old. *Prestcold Division, Pressed Steel Co. Ltd., Swansea.*

Drying cabinet for domestic use

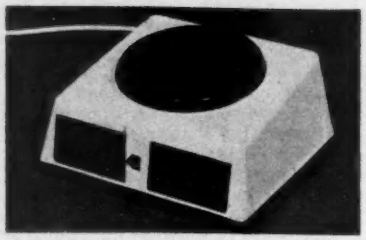
BASICALLY similar in design to the old "Cadet" model, Chalex have introduced a domestic drying cabinet. The main difference is that the new model sells at £9 14s 6d, whereas the "Cadet" cost more than £18. This unit has 15 ft 9 in. of plastics-covered drying rail and an element protected from drips by a pitched louvred cover which does not impede convection. Twin heat control gives 1,250 W and 625 W loadings and temperatures can be raised to 400°F. *C. Hounslow Ltd., Chalex Wks, Southwick, Sussex.*

Boon for tired feet

THE discomfort of tired feet can now be banished claim Pifco, who launched a foot massager on the market last week. Operating on the vibratory principle the massager is compact, with a cream and maroon casing and central vibrating dome. Powered by standard a.c. mains supply, it has an on/off switch set centrally in the front panel. One foot at a time is moved backward and forward from heel to toe across the vibrator dome, and waves are sent through it. The massager costs 4 gn and is now on sale. *Pifco Ltd., Pifco Hse, Watling St, Manchester.*



Restyled drying cabinet by Chalex



For tired feet, Pifco's foot massager

Materials for Electrical Design

REINFORCED RESIN MATERIALS AGREEMENT

IN accordance with a recent agreement, BICC announce that they are to act as sole UK agents for fibre-reinforced resin materials manufactured by Thermotank Plastics Engineering Ltd. In addition, both companies are to continue a programme of development of these materials for electrical applications. Fulfilling requirements of high electrical and mechanical strength, present applications include the fabrication of staywire insulators, switchgear operating rods and also support members and insulators for o.h. lines and traction catenaries. *British Insulated Callender's Cables Ltd., 21 Bloomsbury St, W.C.1.*

WIRE ENAMEL STRIPPER

FOR stripping enamel and synthetic coatings from winding wires, a new compound introduced by Roto-Finish Ltd. is simply applied to the coating and left. After a short time the coating lifts from the wire and can be wiped away. For fine wires a diluent is available to thin down the stripping compound. *Roto-Finish Ltd., Mark Rd, Hemel Hempstead, Herts.*

POLYTHENE FOIL FOR CABLES

NEWS comes of completion of tests to determine the efficacy of polythene-foil strip in providing a moisture-proof sheath for paper-insulated telephone cables. Previous experiments with submarine cable have shown that a plain polythene sheath will absorb a significant amount of water after a period of years. Results for the foil-lined material have been promising; a sheath immersed in water for several months has been found to transmit only one-twentieth of the moisture of a plain extruded polythene sheath. Polythene-foil, first produced by Fisher's Foils Ltd. some five years ago, is made up of polythene extruded on to soft-annealed aluminium foil. For cable sheathing the material is in strip form, having a foil thickness of 0·003 in. with a polythene layer of 0·0015 in. The strip is lapped round the cable pairs with its polythene layer outside, and finished overall with a sheath of extruded polythene. This outer sheath fuses with polythene of the lapped material to form, in effect, a single polythene sheath bonded to lapped aluminium foil. Besides forming the moisture barrier, the foil also acts as an electrostatic screen. Designated junction polythene-foil sheathed, this type of construction is to be adopted by the GPO for a number of proposed multi-pair telephone cables. *Fisher's Foils Ltd., Exhibition Grounds, Wembley, Middx.*

ALUMINIUM ALLOYS DATA

A RECENT publication by the Imperial Aluminium Co. Ltd. gives full mechanical and metallurgical details of the complete range of the company's products. Entitled Impalco Technical Data, the contents of the book are divided into four sections. The first deals with nominally plain aluminium products, the second and third with heat-treatable and non-heat-treatable alloys. The final section is devoted to brazing materials and certain miscellaneous items. *Imperial Aluminium Co. Ltd., PO Box 216, Witton, Birmingham 6.*

CHEAPER SILASTOMER

EFFECTIVE since 8 Feb., a cut of approximately 5% has been made on the price of Cold-Cure Silastomer manufactured by Midland Silicones Ltd. This silicone rubber combines excellent dielectric properties with resistance to temperature extremes, oxidation and the effects of many chemicals, and is said to be particularly suitable for encapsulating delicate electronic components. A special advantage is its ease of preparation: by addition of a catalyst it can be cured at room temperature. *Midland Silicones Ltd., 68 Knightsbridge, S.W.1.*

MINERAL STRENGTHENS RUBBER

THE addition of a naturally occurring siliceous kaolin to natural and synthetic rubbers is said, in some cases, to almost double the previous tear strength of the particular grade. Known commercially as Blancomilo, the mineral can be used with advantage to replace the more usual types of filler such as china clay. Another of its properties is to increase the so-called "brightness" of the rubber. *F. W. Berk and Co., 8 Baker St, W.1.*

POWER SUPPLY

Statistics for March

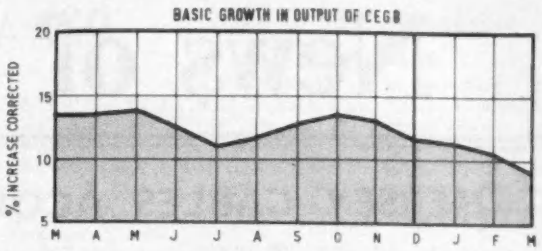
THE abnormally low rate of growth for units sold by the CEGB over the past two months, ½% for the month of February, and an increase of only 1% for March over the same month last year, has tumbled the cumulative increase for the year to only 11·1%. However, this figure agrees fairly closely with the corrected cumulative increase of 11·8% for the year, which allows for temperature conditions and the number of working days. The corrected monthly increase for March alone, on the other hand, was 9·1%, contrasting with the actual units sales increase of only 1%.

Electricity sent out by the area boards totalled 9,153·3 million kWh, and most of the small increases shown by these sales occurred in the industrial areas lead by Merseyside and N. Wales, and Yorkshire, with a rise for the month of 2%, compared with March last year, to 5,603 million kWh.

No new plant was commissioned by the CEGB during the month and the only commissioning north of the border was a 3 MW unit at Lednock by the North of Scotland Hydro-Electric Board. This plant has a Bruce Peebles alternator coupled to a Harland turbine. The station is part of the Breadalbane scheme

Electricity generated by the three boards during March totalled 11,236 million kWh, or 1·9% more than in March, 1960. Generation by the CEGB was 10,330 million kWh, and by the SSEB and NSHEB 634 million kWh and 272 million kWh, respectively. The output capacity of the CEGB fell slightly to 27,067 MW, while little change in the capacity of the two Scottish boards gave a total output capacity for the United Kingdom of 29,875 MW, or 5·6% higher than in the corresponding month of 1960.

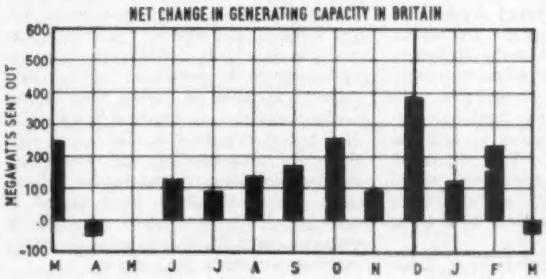
The fuel consumed for generation shows little change as far as coal is concerned, actually a slight drop in consumption for the month of 1·2% to 4,577 thousand tons, and while oil consumption increased by 10·4% over March of the previous year, at 519 thousand tons this represents a relatively minor part of the total fuel consumption. The consumption of coke and breeze fell sharply over the year by nearly 21%, but here, again, since the total for March this year was only 78 thousand tons, the overall effect on fuel consumption is not particularly significant. For the first three months of this year, coal consumption showed an increase of 4½% above the corresponding period in 1960, while the corresponding increase for oil consumption was 11·7%.

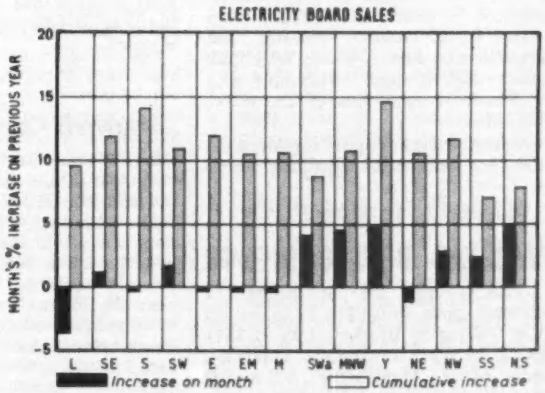


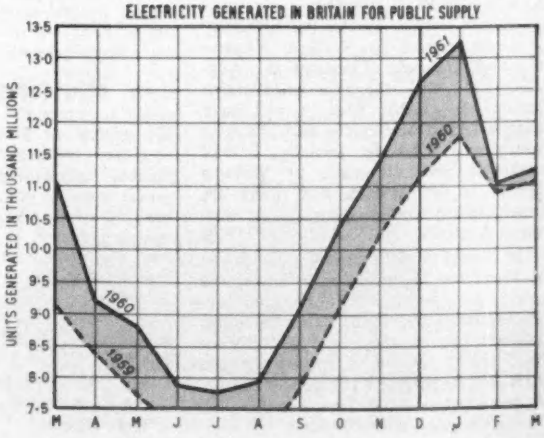
Electricity Board Sales Progress in March

Board	Electricity sent out in millions of units	% change on March 1960
London	858·4	−3·6
South Eastern	596·2	1·1
Southern	783·9	−0·4
South Western	363·6	1·6
Eastern	948·2	−0·2
East Midlands	773·4	−0·1
Midlands	1,040·2	−0·3
South Wales	556·9	4·1
Merseyside and N. Wales	608·8	4·7
Yorkshire	1,050·8	4·7
North Eastern	557·8	−1·1
North Western...	1,015·1	2·8
Direct Supplies by CEGB	330·2	2·0
CEGB Total	9,483·5	1.0
South of Scotland	597·5	−2.0
North of Scotland	174·6	2.2

Tables excludes area board purchases from other sources.







News of the Week

MERSEY CABLES ACQUIRED

Absorbed in Enfield-Standard from 1 May

YET another cable firm is being absorbed. The Mersey Cable Works Ltd. business is being taken over by Enfield-Standard Power Cables Ltd. as from 1 May, under a share exchange arrangement. At Mersey Cables' Liverpool factory, where some 350 people are employed, it is proposed to continue full production, and all outstanding contracts entered into will be completed by the company. It is proposed to continue to use the Mersey Cable name for the time being, but eventually it may be discontinued, Mr E. C. Lee, general manager and director, Enfield-Standard Power Cables Ltd., told the ELECTRICAL TIMES last Friday.

Mersey Cable Wks Ltd., with a nominal share capital of £70,000 in £1 Ordinary shares, has been a wholly owned subsidiary of Tube Investments Ltd. The company was originally formed in 1926 with works at Linacre La, Bootle, and in 1935 became associated with Simplex Electric Ltd., which had been established three years earlier, to operate the electrical interests of Tube Investments Ltd. Sir Ivan Stedeford, chairman of the latter concern, reported last November that Mersey Cable Wks "had another difficult year contending with the disordered conditions of the whole cable industry."

Enfield-Standard Power Cables Ltd., which has only been operating under that title since January, 1960, was formed under a merger of the power cables side of the businesses of Enfield Cables Ltd. (a subsidiary of Enfield Rolling Mills Ltd.) and of Standard Telephones and Cables Ltd.

OVERSEAS DEVELOPMENTS

A PLANT for the production of toughened glass insulators is to be set up by Pilkington Brothers Ltd. at their sheet glass works in Springs, Transvaal, South Africa. Manufacture of a full range of suspension and tension insulators is to start in the autumn.

A jointly owned Australian subsidiary has been formed by Welwyn Electric Ltd. and Overseas Corporation (Australia) Ltd., with the title of Welwyn Electric (Aust.) Pty. Ltd., it will have headquarters in Melbourne and offices in Sydney and Adelaide. Initially, it will handle all products made by Welwyn Electric in Gt. Britain, but plans are already under consideration for production in Australia.

The Skefko Ball Bearing Co. announce the formation in India of the Associated Bearing Co., which is to begin manufacture of ball and taper roller bearings at Poona towards the end of 1962. Main shareholders in the new concern are SKF, Gothenburg, the Investment Corpn, of India (one of the Tata group), plus a minority interest by Skefko.

DERRITRON PLAN DROPPED

THE proposed merger of Beulah Electronics, Direct TV Replacements Ltd. and Direct TV Windings Ltd. into the Derritron Electronic Group of companies is not now to proceed, for purely technical reasons. But the two groups will continue to co-operate in the future, it is stated.

Bradwell Costs and Timing

BRADWELL nuclear power station should be in full operation by the middle of 1962, the House of Commons were told on Monday. Total cost of construction, including incidental road works and the initial fuel charge is likely to be £58 million. On nuclear power generally, it was stated that 1970 is the Government's estimate of a break-even point between the costs of nuclear and conventional generation, assuming 5½% interest on capital. If the interest rate were 2½% the parity date might become 1968.

B.E.A.M.A. Tightens Organisation

CLOSER links between BEAMA and member firms are being sought by the Association, and a step in this direction was a meeting of chairmen of the BEAMA sections last week, at which the chair was taken by BEAMA president, Mr A. M. Browne. The sections, each representative of manufacturers of a particular category of product, are the main direct link of the Association with its members. The aim of the present move is to secure a guide for the Association in framing its plans for the future, and to strengthen the effectiveness of its organisation. Another meeting is in prospect for the autumn, after section chairmen have discussed with their members matters raised at last week's meeting

Cable Industry Census

TOTAL value of electric cable sales by the larger firms in the industry amounted to £102,766,000 in 1958, compared with £87,311,000 four years earlier, it is shown in a new Census of Production Report on the industry, just published by HMSO. Sales of winding wires, strips, etc., provided another £15,665,000 (£13,972,000 in 1954); cable jointing materials and accessories amounted to £1,983,000 (£1,435,000 in 1954); and overhead transmission line fittings a further £2,393,000 (£1,766,000 in 1954).

A summary shows that three years ago there were 101 establishments in the cable industry, with total sales for all goods produced and work done exceeding £151 million (£132·4 million in 1954), employing nearly 60,000 people, whose wages and salaries totalled £28·8 million (nearly £23 million in 1954). The census covers the year 1958, it should be emphasised.

UNIONS PROTEST ON REORGANISATION

IN protest at plans under the CEGB Regional reorganisation scheme, Union leaders representing manual workers in power stations boycotted last Thursday's meeting of the NJAC for the electricity supply industry. They objected to certain of the proposals, particularly the appointment of five new Regional personnel officers with salaries around the £3,515 mark, which, they maintain, would be an unjustifiable expense; would duplicate work already done at district level; and probably interfere with trade union negotiations.

The Electricity Council have since pointed out that the union leaders attended an earlier NJAC meeting when the general scheme of reorganisation was put forward, but without the consequential details. It is considered that the appointment of personnel officers will improve methods of dealing with labour relation matters at regional level. It is also hoped that further discussions with the union representatives will remove any misapprehensions on the matter. Meantime, the union chiefs have agreed in principle to form a sub-committee to consider plans for a new wage claim for manual workers in the industry.

FALSE ENVELOPES ALLEGED IN E.T.U. CASE

ALLEGATIONS that envelopes, in which disallowed branch votes for the ETU general secretary election were held to have been posted to the Union's head office, were not those used by the local officials concerned were made in the hearing of the High Court action over the past week. Several officials stated that the envelopes shown to them at head office when the reasons for rejection were queried, had a later and different postmark. In each case the branch votes had been largely in favour of Mr Byrne, who opposed Mr Haxell in the election, it was stated.

In all, it appeared that the votes from 113 branches had been disqualified—85 on the sole ground of late receipt.

Mr Justice Winn said it seemed there could be only three explanations for the late arrival of returns: that they were actually posted later than they were said to have been; that there had been very unusual post office oversights; or that those envelopes produced had been fraudulently prepared.

Earlier he had made it clear that he was not prepared to have any attempt made to influence him that because a man was a Communist he was not to be believed or trusted to conduct his affairs honestly and straightforwardly.

On Monday an affidavit by Mr Haxell on the disposal of 26,833 excess ballot papers sent to head office was presented. This indicated that the papers were destroyed about 23 Dec., 1959.

In the action, which began on 18 April, Mr J. Byrne, ETU Glasgow district secretary, and Mr F. Chapple, a member of the Executive, seek a declaration that the election of Mr F. Haxell as general secretary was void, and claim damages for alleged conspiracy against Mr F. Foulkes, president, Mr Haxell, and 14 other members of the Executive. The hearing continues.

OFFICIAL PUBLICATIONS

Census of Production: Insulated Wires and Cables. Report for 1958. HMSO. 2s (see page 686).

General Engineering Courses. Ministry of Education Administrative Memorandum 10/61 (see page 689).

Installation of Directly Embedded Electric Floor Warming Systems. Information bulletin. EFWA (see page 666).

BS amendment slips:

535, Bulbs for miners' electric lamps: PD 4073; 731, Part 1, Flexible steel conduit and adaptors for the protection of electric cable: PD 4074; 883, Cables and flexible cords for electrical equipment of ships: PD 4066; 1793, Audio-frequency transformers for cinematograph equipment: PD 4091.

Harwell gives up particle accelerators

DEVELOPMENT of particle accelerators, the high energy machines used in fundamental nuclear physics research, is in future to be a responsibility of the Rutherford Laboratory of the National Institute of Research in Nuclear Science, instead of the UKAEA, Harwell establishment, it is announced. Mr L. B. Mullett, who has been head of the Accelerator Division at Harwell, has joined the Rutherford Laboratory as assistant director for accelerator and applied physics research. Most of the Authority's personnel engaged in accelerator development have also been transferred. The National Institute is primarily concerned with design, construction and operation of high energy particle accelerators for communal use by universities. The services of the institute are to be available for development and construction of any new accelerator required by UKAEA.

G.E.C. step up appliance programme

ANNOUNCING price reductions for their Treasure 4 and Treasure 3 cookers (see page 682) the General Electric Co. reveals that their Swinton cooker works are engaged on the largest output ever undertaken by the company. This expansion "is the forerunner of a new and vigorous production policy, the full effects of which will be increasingly apparent as we unfold a major appliance programme," Mr C. F. Richards, of the Domestic Equipment Group, states. Reorganisation of the company, now well under way, is enabling it to adapt quickly new techniques to production lines.

Belfast Ceremony

TO mark the completion of the Belfast West power station, the Northern Ireland Prime Minister, Lord Brookeborough, will unveil a plaque on 5 May. Started by Belfast Corporation in 1951, the station now has five machines totalling 240 MW in service. The first stage of two 30 MW sets was completed in 1955, and the extension has three 60 MW machines.

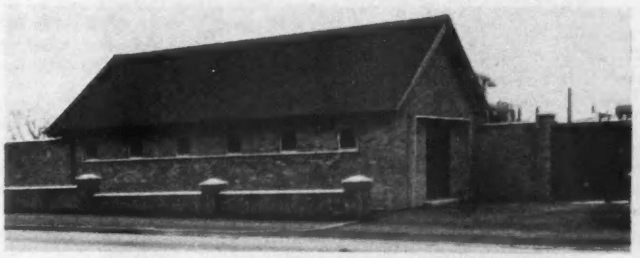
PAYROLL ALLOWANCE FOR APPRENTICES SUGGESTED

SHOULD apprentices and trainees be included in any payroll tax? That is the question raised by Mr R. F. Marshall, central education manager of Associated Electrical Industries Ltd., among the many protests from businessmen on the likely effect of the proposed payroll tax outlined in last week's Budget. Mr Marshall points out that at a time when industry and commerce are being urged to increase the number of apprentices in training, the threat of an employee tax may deter this desirable expansion, particularly among the small and medium-sized firms. It might also discourage the larger-sized firms, many of which are already training home and overseas men to the fullest extent of their capacity, from maintaining their high load of apprentices and trainees. He suggests that employees should receive a payroll allowance on the basis of one apprentice to two adult employees.

In the debate on the Budget in the House last week, Mr Selwyn Lloyd emphasised that the Government would have power to vary the levy and they were prepared to do so if it seemed right as between various classes of employees, women and children, boys and girls. He admitted there would be certain administrative delay in the measure which would take some weeks to bring it into effect.

Substation Praised

SUBSTATIONS are more often the objects of opprobrium than praise, but the care taken by Eastern EB over the appearance of a new installation at Godmanchester was rewarded recently when Ald W. Brown, chairman of Huntingdonshire CC, described it as "attractive," while functional in every way. The 33/11 kV substation, serving the twin towns of Huntingdon and Godmanchester, lies to the side of the main Cambridge-Huntingdon road on the southern fringe of Godmanchester. At the official opening on 7 April, Ald Brown planted a commemorative tree, one of several beside the new building.

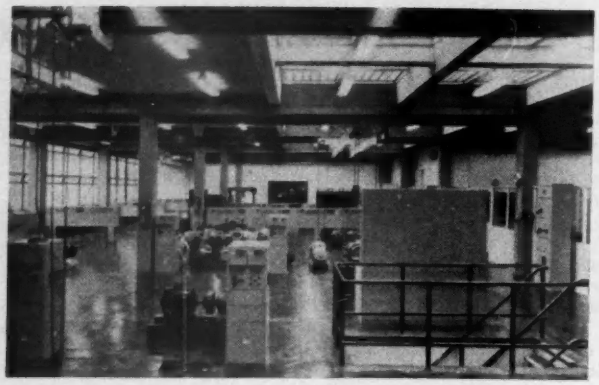


A front view of EEB's new 33/11 kV substation at Godmanchester

COLLEGE EXPANDS

THE first stage of expansion planned for the Imperial College of Science and Technology has been completed. It comprises a new building to accommodate the central college boiler house and the heavy electrical machine laboratories and departmental workshops for the Department of Electrical Engineering. Building and civil engineering contractors for the work were Wates Ltd., with T. Clarke and Co. Ltd. responsible for the electrical installation side.

Work has already started on the second stage—a new building for the Department of Mechanical Engineering—due for completion by mid-1962.



General view of the heavy electrical machine laboratories of the Dept. of Electrical Engineering at Imperial College of Science and Technology, part of the first stage of expansion scheme

Electric Traction at Imperial College

LAST year BEAMA and the British Transport Commission decided jointly to sponsor a new section of the electrical engineering department at Imperial College (Prof A. Tustin) devoted to the study of electric traction. The section has started to operate during the present academic year and some details of its organisation have been released.

It is intended that, eventually, the course will be under the direction of an engineer of reader status, appointed by London University. The College already possesses a good deal of suitable equipment, and considerable space has been allocated in the College's new electrical laboratory for the traction course.

Object behind the course is supplementation of the supply of junior engineers having some knowledge of the highly specialised problems of electric traction. Both British Railways and their suppliers have had difficulty in recruiting such men.

The normal study period for engineers attending the course is one year. They attend lecture courses on fundamentals, machine and control design in the traction context, rectifiers, and railway signalling and communications. There is also a course of lectures given by visiting engineers on specialised traction topics.

Besides work in the College laboratories, students receive instruction on traction equipment and installations either at the BTC electrical laboratory at Willesden, or on railway lines; work designed, in the words of the official statement, "to help bridge the mental gap that can so easily occur between academic teaching and actual practice."

To help the setting up of the new section, British Railways have seconded Dr H. I. Andrews, assistant electric traction engineer at headquarters, to organise the course for the first year on a part-time basis. AEI have similarly loaned the services of Mr K. P. Grimshaw, a specialist in traction motor design.

So far, emphasis has been on setting up the new organisation, but it is planned to start shortly on a programme of research. In this connection, work is already in hand for designing and building apparatus for studying the internal behaviour of a traction motor in the laboratory, under conditions corresponding to those of actual working. Other research is in hand into such subjects as the heating and commutation of d.c. motors, variable speed control of a.c. motors, and the use of transistors in signalling systems.

Board Stages Refrigerator Fair

£150 worth of equipment for an all-electric kitchen, comprising refrigerator, cooker and washing machine, is being offered by the South Western EB as first prize in a free competition. The competition is being held in conjunction with a Refrigerator Fair which opened in all the Board's main service centres on Monday and will continue until 6 May. Refrigerators will also be available for a week's trial and every purchaser will receive a 5s voucher for frozen food.

HONG KONG BUYING MORE APPLIANCES

A SMALL but growing market for domestic appliances in Hong Kong is reported by the UK Trade Commissioner there. The market is small for two reasons: entrepot trade is negligible and of the 3·1 million population only the non-Chinese community of about 25,000 people and some tens of thousands of comfortably off to wealthy Chinese families represent effective demand. But such has been the pull of the new factories that a comparative shortage of servants has developed in the past three years or so, despite the influx of refugees from the mainland, so that these days only wealthy households have more than one servant and this has led to rising sales of labour saving devices.

The Japanese, only ten days away by ship, have been quick to take advantage of this change and have captured the lion's share of the washing machine market. In 1960 they sent in 4,156 washing machines, whereas Britain was second with only 628. The fact that Hong Kong is a Crown colony is no help to UK firms because it is a free port with no import restrictions and no duty. The US came a poor third with 155 sales, and Germany and Italy have also tried the market though with little impact.

At present there is no local manufacture of washing machines, but this situation may not last long as a Hong Kong firm which recently signed an agreement with Westinghouse for the production of air conditioning equipment and fans is understood to have plans to manufacture a full range of domestic appliances under licence to the American company.

The Trade Commissioner's survey, which appears in the BoT's Export Service Bulletin, also covers dish washers and clothes dryers. The position with dish washers is not clear because they are included with washing machines in trade statistics, but sales are known to be negligible. Nor are sales of clothes dryers, including spin dryers, sizeable at present, though the humidity of the climate presupposes a certain potential. Japanese dryers have not yet been on sale as separate units, and in the absence of their competition the large US heated tumbler dryers are the market leaders, with exports valued at about £2,750 in 1960, and smaller spin dryers from Germany and Britain not far behind with sales of £2,500 and £2,100 respectively.

Power supply on the island is 200 V 50 cycles a.c. The market is extremely brand conscious and in the words of the Trade Commissioner competition "can only be described as cut-throat." The Japanese are conducting telling advertising campaigns in all media and are also using door-to-door canvassing.

COURSES FOR TECHNICIANS

GENERAL engineering courses for 15-year-olds and 16-year-olds, who show promise of being able to qualify as technicians, are in an advanced stage of planning. Such courses were foreshadowed in the recent White Paper "Better Opportunities in Technical Education," and details are given in a memorandum sent by the Minister of Education to local education authorities.

Special feature of the course is that it will suit students proceeding either to an Ordinary National Certificate course or into one of the technician courses envisaged in the White Paper, such as the City and Guilds electrical technician's course. About 240 hours for instruction are assumed to be available in each year of the course, which will last two years for students leaving school after a four-year secondary course, and one year for those leaving after five years at secondary school. In each year of the course the curriculum will comprise engineering science, mathematics, workshop processes and materials (including practical work), engineering drawing, English and general studies.

The Minister is asking technical colleges to make a special effort to get courses started in the coming autumn.

There will be an external examination at the end of these courses and those passing may be admitted to the O1 course for ONC provided they have reached "credit" standard in mathematics and engineering science, or otherwise to the second year of a technician's course, provided they obtain a pass in three subjects. Those failing may still be admitted to the first year of a technician's course or to a craft course.

Nuclear Mission in Australia

THREE senior representatives of the UKAEA are in Sydney, Australia, for discussions with the Australian Atomic Energy Commission on research co-operation. The mission consists of Dr H. Kronberger, deputy managing director (development), Reactor Group, Mr L. Grainger, assistant director, Atomic Energy Research Establishment, Harwell, and Mr R. C. Orford, commercial and overseas manager, Reactor Group. It is now nearing the end of a ten-day stay which has included visits to universities as well as discussion with the AEC. Arrangements for the exchange of research results between the UKAEA and the Australian AEC have existed for some time.

New E.M.I.-M.R. Appliance Division

AS a result of the acquisition last year of Morphy-Richards Ltd., the UK domestic appliance activities of the EMI Group has been reorganised and a single division has now been formed under Mr W. Roxburgh, managing director of Morphy-Richards.

The marketing and distribution of hi-fi components is to be undertaken by an associate of EMI—Clarke and Smith Manufacturing Co. Ltd. That company has also acquired the business of Home Maintenance Ltd., the service company of EMI. The marketing of sound equipment will continue to be done by the Gramophone Co. under managing director Major J. S. E. Clarke. The Recording and Relay Division of the Gramophone Co. has been transferred to EMI Electronics Ltd.

BRITAIN'S FIRST SPACE COMPANY

THE nation's business leaders have no intention of seeing Britain left out of the space race, particularly as regards any commercial applications. British Space Development Co. named its nine founder members last week, a list which aroused no surprise after a preliminary announcement in February, except that Plessey have joined in. The others are: AEI, ATV, BICC, Decca Radar, Hawker Siddeley Aviation, Pye, Rank TV and Rolls-Royce.

Sir Robert Renwick has been appointed chairman of BSD and the other members of the board are Mr J. R. Brinkley, Group Capt. E. Fennessy, Mr G. C. I. Gardiner, Mr A. A. Rubbra and Group Capt. D. Saward.

A technical committee has also been formed, under the chairmanship of Mr G. K. C. Pardoe, with first priority given to the task of submitting proposals for the use of space for communications. Mr Pardoe, who is with the de Havilland unit of Hawker Siddeley, was engaged in the development of Blue Streak. There are nine other members, one from each of the constituent companies; they are: D. E. Burchett (AEI), A. V. Cleaver (Rolls-Royce), J. M. C. Dukes (Plessey), W. F. Hilton (Hawker Siddeley), W. M. Lloyd (Rank), L. F. Mathews (ATV), K. Milne (Decca), T. P. Blott (Pye) and G. A. Dodd (BICC).

Lavish Prizes in A.E.I. Competition

EVERY week until 10 June, 40 new owners of Hotpoint washing machines and 40 buyers of "Iced Diamond" refrigerators will have the full purchase price refunded as part of AEI's 40th birthday celebrations. The lucky customers will be winners of a competition to list in order of importance the reasons for choosing a Hotpoint product. Entry forms are available from dealers.

Cook Strait Cables

IN the description of the New Zealand transmission scheme involving submarine cables across Cook Strait (page 497, 27 March), some cost estimates were given which include an incorrect figure. The value £8·9 million quoted applies to the total cost of overhead lines and cables from Benmore to Haywards. This is made up of £6 million for the 360 miles of overhead line, and £2·9 million for two 25·5 mile submarine cables plus a spare.

Modernising Greenock

THE tariffs of the South of Scotland Electricity Board were likely to remain stable over the next two years; and, if any change took place in the off-peak rates, then the movement would be downward, Mr William Hutton, deputy chairman of the Board, forecast at the opening of the "Living Electrically" Exhibition at the Town Hall, Greenock, earlier this month. He also emphasised that the Government's targets for the nationalised industries were just the targets that the South of Scotland EB had already set for themselves.

Designed to show the part which electricity can play in Greenock's two major schemes—redevelopment of the town centre and a clean air drive—the exhibition had as its centre-piece an electric house, with surrounding displays of space and water heating equipment, in which the use of cheap off-peak electricity was emphasised.

At the opening of Greenock's "Living Electrically" exhibition, left to right: Mr J. Reid, Provost of Greenock; Mr Hutton; Mr H. B. Bruce, manager, SSEB Clyde area; and Mr J. W. Moule, chief commercial officer, SSEB

A corner of the new West Country depot of Berry's Electric Magicoal Ltd. recently opened at Trusham Road, Marsh Barton Trading Estate, Exeter. The new premises have six times the storage space of the old depot, plus large offices, parking bays and service facilities

VACTRIC REALISATION HIGHER THAN ESTIMATED

CREDITORS of Vactric (Manufacturing) Ltd. are likely to get a better return than was earlier envisaged. This news was given to the ELECTRICAL TIMES last week by Mr E. R. Nicholson, one of the joint liquidators, following an auction of the residue of the stock of washing machines, spares, etc. At that sale, 3,700 washing machines, mostly new, were disposed of, together with 9,000 ¼ h.p. motors—which we understand was less than half the total stock at the time of liquidation last November.

Last week's sale was "reasonably successful," providing higher figures than anticipated, but the names of the buyers have not been disclosed.

Earlier, Vactric's Bolton factory had been sold to an outside concern, the plant was disposed of at an auction sale and the largest proportion of stock of new washing machines bought up, in each case the price being better than expected.

The result is that assets of the company have realised appreciably more than the figure estimated in the statement of affairs (£161,000).

Buyer Found for Vactric Subsidiaries

THE News of the World Organisation Ltd. has agreed to purchase the whole of the issued capital of Vactric (Control Equipment) Ltd. and Vactric (Precision Tools) Ltd. The price has not been disclosed, but it will be paid to the Receiver of Vactric Ltd., which is in liquidation, and consequently benefit creditors. Unlike the washing machine and vacuum cleaner activities which caused the group's failure, these two subsidiaries have continued to operate profitably and their works in London have not been closed down. Mr T. W. Roberts will continue as managing director of the two companies, with Sir William Carr, News of the World chief, as chairman.

BETTER OUTLOOK FOR A.E.I.

MORE favourable results from the majority of Associated Electrical Industries Ltd's divisions were forecast by the chairman, Lord Chandos, at the annual meeting in London last week. The outlook for those parts of the business which were predictable was much better than in 1960, and while there was no doubt that the group faced a difficult year in exports and in the entertainment and appliance fields, they were well equipped to do so.

Referring specifically to the four parts of the group's activities which had been giving anxiety a year earlier, Lord Chandos said cable business should be profitable this year and make a "considerable difference" to overall results, now that rationalisation in this field was complete. During 1960 the average prices of cables in the two main categories, mains cables and thermoplastics and rubber-covered cables, were still about 17% below the April, 1959, level.

Secondly, in the field of telecommunications, the Post Office could plan ahead now that it no longer had to return its surplus to the Treasury each year, and AEI's Telecommunications Division could plan ahead with it. This division traded at a marginal loss in 1960 but a moderate return on capital was expected for 1961.

In lamps and lighting, the long and intricate task of rationalising production was practically complete. The company increased its share of the market in 1960 and traded at a better though still inadequate profit.

Nuclear power was next to come under the spotlight. A modest profit was expected from the Dungeness station, the order for which had been received in July, 1960. "I cannot but express my disappointment that the engineering and scientific effort at Berkeley may be rewarded with a loss," Lord Chandos said. "But if you regard the money which we may lose as a development expense and not as a contractual loss, large though it may be, it brings the whole subject into closer perspective."

As was to be expected, the Glasgow railway failure was raised by a shareholder in the questions which followed the chairman's address. The shareholder asked whether the adverse publicity which followed the transformer explosions had had any adverse effect on traction business. In reply, Lord Chandos said there had been a most decided effect; business had declined substantially. However, the end of the matter might be different. The current position was that 60 of the 91 transformers had been modified and some trains were running again experimentally.

Patent infringement alleged in U.S.

WESTERN Electric Co., New York, is seeking an injunction to prevent Transitron Electronic Corp. of Wakefield, Mass, from manufacturing certain semiconductor devices and using certain techniques on the grounds of alleged infringement of patents. Filing of the suit with the US District Court in Massachussets marks the collapse of four years of negotiations between the two companies in an effort to reach a licensing agreement. The patents involved are part of the Bell System, and relate to silicon diodes, alloyed semiconductor devices, diffusion techniques and oxide masking processes.

Three killed by switch mistake

WITHIN a month of a Yorkshire jury recommending more comprehensive instructions on switchgear in order to prevent accidents, the incorrect operation of a switch has been blamed for an explosion in a Monmouthshire factory basement in which three men were killed and a fourth seriously burned.

The four men were showered with blazing oil when one of a set of switches exploded at the Rogerstone factory of Alcan Industries, the aluminium group. At the inquest, Mr D. C. Mitchell, an electrical engineer, said examination of the damaged apparatus indicated that proper interlocking procedure had not been adopted and a slight movement of the handle had allowed the moving contacts to approach the earth, causing an arc or current in the oil. Verdict, accidental death.

S. Scotland uses more buried transformers

UNDERGROUND transformers are finding favour with South of Scotland EB, which has ordered 30 from Ferranti since January. All but one of the units were of Ferranti's oil-filled insulated Class "A" variety, with three-phase and 50 cycles, 12 being of 500 kVA rating and 17 of 1,000 kVA. The odd one was a 500 kVA dry Class "C" insulated unit.

Only a comparatively small pillar, which can be concealed in a hedge, shows above the ground, so these units offer a useful alternative to attempting to acquire new substation sites or replacing existing transformers with larger units.

Two 'fridge shows for 1962

TWO refrigerator exhibitions are planned for London next April. The first, with the title of Third International Refrigeration and Air-Conditioning Exhibition, is to be at Earls Court from 9 April to 12 April, and the other, entitled International Refrigeration Fair, will be held for the first time at the Grand Hall, Olympia, from 13 April to 19 April. The latter is being sponsored by the British Refrigeration Association, and supported by DoRDeC, the Institute of Refrigeration, and the National College for Heating, Ventilating, Refrigeration and Fan Engineering.

The question of two exhibitions of similar titles was the subject of recent legal action, it seems, but an application for an injunction against the second show named was not granted provided it was held subsequent to the other.

Increased Membership for Research Association

MEMBERSHIP of the Heating and Ventilating Research Association is now 275, an increase of 15, it was reported at the second annual general meeting recently. The Association last year had a subscription income of £16,800, which earned £11,000 in Government grants. The director of the Association, Mr N. S. Billington, said it was trying to pursue a balanced programme of research.

Birmingham's Anniversary

LAST week-end saw the seventieth anniversary of Birmingham's first public electricity supply. It was on 22 April, 1891, that Alderman F. C. Clayton, the then Mayor of Birmingham, officially opened the generating station at Dale End of the Birmingham Electric Supply Co. A provisional order for the lighting of the city centre had been granted by the Board of Trade in 1889 to Chamberlain and Hookham Ltd., who sold it in the following year to Holmes and Vaudrey, of Liverpool, who had previously initiated electricity supply at Liverpool. Mr J. C. Vaudrey, as managing director, was given the task of planning the Birmingham installation, and when the Corporation took over the undertaking in January, 1900, he became city electrical engineer there, a position he held until retiring in 1903. For the purchase, the Corporation paid £420,000 (borrowed from the Public Works Loan Commissioners), and, reporting this in our issue of 4 Jan., 1900, the comment was added "as in the case of Sheffield the price paid for goodwill is approximately equal to the capital expenditure and it remains to be seen whether Birmingham will be any happier than Sheffield is at the end of the first year of municipal working. The extremely heavy interest and sinking fund charges resulting from so inflated a capital account will handicap the undertaking for many years to come"

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, April 25

	£ per ton	Weekly change £
COPPER, standard class A (settlement)	230	+½
" (3 months)	231½	+½
LEAD, refined pig, 99·97% purity (cash)	68½	+1½
" (3 months)	69½	+1½
TIN, refined, min. 99·75% purity (settlement)	843	+5
(3 months)	852	+5½
ALUMINIUM, ingots 99·99·5%	186	—
" wire bars (4×4×54")	193½	—
BRASS Strip 63/37	201½	—
SILVER (Troy oz)	79⅛d	−¼d

	£ per ton	Weekly change £
ZINC, virgin, min. 98% purity (cash)	83½	−½
" (3 months)	83½	−½
RUBBER, per lb. No. 1, RSS, spot	27⅛d	+⅛d
c.i.f. basis, ports, July	27d	—
ARMOURING: Galv. Steel Wire (0·104 in.)	66½	—
Mild Steel Tape (0·04 in.)	53*	—
NICKEL (home)	600	—
MERCURY (76 lb flask)	67	—
AMERICAN PRICES: Copper, electrolytic (per lb)	29c	—
Lead, (New York)	11c	—

* *Tape Price, now an average, includes varnishing*

Electro-heat Conference in U.K.

THE annual meeting of the Executive Council of Union Internationale d'Electrothermie (UIE) has been held in the UK for the first time this week. UIE was formed at the conclusion of an international congress on electro-heat in Paris in 1953, and now has a membership of 14 countries. Aim of UIE is to establish permanent liaison between member countries on matters connected with the industrial application of electro-heat, although excluding matters of purely commercial importance. It operates with a secretariat in Paris, and the UK member is the British National Committee on Electro-Heat, for which EDA supplies the secretariat.

After the executive committee meeting in the Winsley St offices of the Electricity Council, delegates and their ladies were taken on a tour of the Midlands EB area, including a visit to induction heating equipment at Garringtons Ltd.

The UIE is planning to hold its fifth international conference in Wiesbaden, Germany, in the autumn of 1963. To meet difficulties that have been experienced at earlier conferences at obtaining sufficient discussion of papers, the number presented is to be limited to 120, including 20 from non-member countries, such as the USA and USSR. Agreement has been reached in principle for a sixth conference to be held in London in 1967 or 1968.

Sayings OF THE WEEK

"I dare to think the British business man abroad tends to take himself far too seriously and his work not seriously enough." . . . MR A. ST. JOHN SHUTTLEWORTH, chief information officer, Federation of British Industries, at the Institute of Public Relations conference.

"People sometimes tend to belittle the mechanical age in which we live—as though it diminished the zest for craftsmanship. The exact opposite is the case." . . . MR A. I. BAKER, at opening of the Engineering, Marine, Welding and Nuclear Energy Exhibition.

"I find the much maligned nationalised industries among the most open-minded, business-like buyers to deal with." . . . C. H. CLARY, writing to the *Financial Times*.

The Spirit of Electricity Shines on London

"THE Spirit of Electricity," the controversial 80 ft sculpture on the tower of Thorn Hse above Upper St. Martin's La, is now fully assembled and being floodlit at night. (We published a picture of a mock-up on 30 March.) At least one tourist motor coach has stopped at the spot to allow the sightseers to form their opinions on the soaring abstract with its coppery green patina. The method of achieving this colour on the new metal was almost as unconventional as the artist's conception itself; the metal was treated with an inorganic fertiliser.

Thorn's only stipulation to the artist, 36-year-old Geoffrey Clarke, one of the chief designers of the stained glass for the new Coventry Cathedral, was that artificial lighting should be an integral part of the design. From that point Mr Clarke took his inspiration from the filament of a lamp, an idea well adapted to built-in lighting. Four 50 W spotlights in the base of the "shield" and adjacent to the "spear" are directed upwards to provide the main illumination, and other lights include 48 W headlamps and 6 W spherical lamps. Total load is 45 A and, to overcome the technical difficulties presented by such an exposed feature, the lamps are on a 12 V supply. The effect overall is to give the sculpture two identities, one by day and the other at night, the integral lighting emphasising the texture of the bronze and revealing forms not seen in natural light.

News in Brief

The 650 workers at AEI-Hotpoint's Peterborough factory who were put on a four-day week three months ago have now returned to full-time working.

Blades and heads for electric shavers are covered by an Import Duty Drawbacks order made by the Treasury last week, so duty may be retrieved if the goods are re-exported. The order also covers base metal parts of blades and heads.

The Electrical Wholesalers' Federation have just issued the 1961-62 list of members, copies of which are available from the Federation, price 1s.

A revised list of recommended domestic electrical appliances has been issued by EDA.

Some 400 members and friends of the AEI Long Service Association at Willesden celebrated the fiftieth reunion at Wembley Town Hall last Thursday.

The new Scottish headquarters of Philips Electrical Ltd., at Waterloo St, Glasgow, were officially opened last week by the Lord Provost, Mrs J. Roberts.

The flats and maisonnettes which Tynemouth Housing Committee propose to build in the Charlotte St area of North Shields are to be all-electric.

RETAIL SELLING CONFERENCE

MEMBERS of NECTA had an opportunity of attending a conference on "Premises as a Selling Place" recently, as part of the Association's increasing activities in the sales training field. With Mr H. F. Truman, chairman of NECTA Retailers' Committee in the chair, the conference was opened by the Association's vice-president, Mr C. J. Veness, who stressed the importance attached by NECTA Council to the proper approach to retailing problems.

Mr D. Jones, the Association's sales training officer, discussed "creating a buying atmosphere" with the emphasis on the need for premises that matched electricity's claim to be clean and simple. An electrical retailer's shop or showroom had to be planned to place no barrier, physical or psychological, between the customer and the goods. After a British Productivity Council film had been shown, Mr J. T. Seago, of Courtney Pope (Electrical), talked on planning or replanning a shop and suggested that in the great majority of cases sales went up sharply because of the attraction a "new shop" had for customers. Finally, Mr A. D. Charters (BLC) dealt with lighting and selling from a shopkeeper's point of view.

At NECTA's selling conference: left to right: Mr D. Jones (sales training officer), Mr W. J. Jones (BLC), Mr C. J. Veness (vice-president), Mr H. F. Truman (chairman, Retailers' Committee), Mr A. D. Charters (BLC) and Mr J. T. Seago (Courtney Pope)

Company Activities

ALREADY the Budget is being consigned to the cobwebbiest corners of the market mind. For there was nothing in it about which investors would want to complain too loudly. However much Mr Lloyd may regard his measures as counter-inflationary the Market clearly thinks otherwise and signified as much the morning after the night before by hoisting the *Financial Times* equity index to a then new all-time "high" of 354·9.

Profits tax up one-fifth from 12½% to 15%, the new imposts upon fuel oil, the threatened use of a payroll tax and purchase tax increases by up to 10%—all are real or impending additions to manufacturing and commercial costs which are more likely than not to erupt before long in a rash of price increases. Already the retail price index appears to be on the forward march again after two and a half years' hibernation. This is the climate in which the equity must continue to flourish and particularly so now that the half-expected capital gains tax did not materialise.

Electrical share prices for their part last week appeared to be affected as much by items of company news as by the Budget proposals. Murphy Radio turning in a loss of £76,039 against a 1959 profit of £668,085 and no dividend for 1960 against a previous and forecast 22½% cast its gloom over the radio market. Murphy themselves were knocked 2s to 12s 1½d, after opening the week at 14s 7½d, and closed lower at 11s 9d. British Electronic Industries—the Pye-E. K. Cole merger—finished 7½d lower at 14s 6d while even Decca Ordinary, which had soared from 72s before the Budget to 76s after, had to fall back to 75s 6d. Ultra Electric tumbled 3s 7½d to 20s 1½d on the sale of a 40% interest in their electronics subsidiary, but by the week's close had recovered to 23s.

The 10% advertising tax on the TV contractors momentarily staggered the television group. Associated Television "A" dropped from 3[illegible] to 30s 3d the morning after the Budget but in common with its fellows staged a comeback—in ATV's case to 31s 3d. Granada "A" was cut back from 57s to 54s on the tax but then recovered to 56s 3d, while TWW, down at one time to 26s 6d after starting out at 28s 10½d, switched up by the end of the week to 27s 3d. It seems that the TV companies will be allowed to pass on the tax if they so wish either in whole or in part to their clients. The gloom in this market did not therefore last very long, while news of peak TV advertising revenue at £8·3 million in March—running at an annual rate of £100 million against £77 million in 1960—added a touch of brightness.

The possibility of a payroll tax favouring capital intensive rather than labour intensive industries brought buyers in for International Computers and Tabulators. At the start of the week the shares stood at 95s 3d, rose to 100s 9d after the Budget, then eased back to 99s at the week's close. Elliott-Automation, on the other hand, managed to gain no more than 6d over the week at 35s 9d.

Taking the longer view from the electrical industry's standpoint, investors will gain heart from the comments of Lord Chandos, chairman of AEI, at the company's yearly meeting last week. He cannot see any general expansion in industry or in national prosperity, either in this country or in any other, unless the electrical industry is in the forefront.

Taking the short view, however, dealers were not so happy and AEI's £1 Ordinary shares, 48s before the Budget, dropped to 46s 3d before the meeting and a further 1s 3d to 45s after the a.g.m., now to yield as much as 6·7%.—*From Our City Correspondent.*

Allen West

Steady profit of £407,485 before tax (previously £408,168) was earned in the year to 31 Jan. and dividend is maintained at 13½%, of which 1% is again labelled bonus. After tax, net profit is £242,595 (*£241,132*), to which is added £39,706 (*£35,212*) for tax provisions no longer required.

Babcock and Wilcox

A slight recovery in 1960 brings pre-tax profit up to £890,584, after earnings had plummeted from £3·3 million in

1958 to £523,154 in 1959. Dividend is maintained at the 9% level paid in 1959 (13% in 1958). The group has moved from the credit to the liability position as far as tax is concerned, a charge of £157,944 for 1960 contrasting with a credit of £150,137 in 1959. This leaves net profit at £732,640 (£673,291 in 1959). The dividend, with preference charges, absorbs £576,759 net.

Barton and Sons

Dividend is raised by 2½% to 20%, profits are up from £1,044,315 to £1,135,113 and directors propose a one-for-four scrip issue. After providing £547,142 for tax, preliminary net profit for 1960 is £587,971 against £545,217 previously.

Bulpitts (Swan Brand)

Prospects for 1961 are difficult to assess at this stage, the chairman states in his annual report. Demand for the principal proprietary products continues at a high level, but other sections have not fully recovered from the credit squeeze. Trading profit fell from £685,289 to £592,248 in 1960, but the dividend was held at 16¼%.

Elliott-Automation

Growth in profit continues. Including £520,648 contributed by Rheostatic, profit is £1,776,510 against £1,015,630 in 1959, before that acquisition. Net profit is up from £548,875 to £959,647 and dividend is raised to 13% from an effective 9¼%.

Enfield Rolling Mills

The level of activity so far this year is not unencouraging, Lord Verulam says in his annual report. While lower than at the beginning of last year, it is still a good level. Enfield-Standard Power Cables, jointly owned with STC, traded at a substantial loss last year, but technical integration through the two parents is being successfully achieved. Barker and Allen in Birmingham had a very successful year, as did W. E. Martin and Refrigeration Appliances. During the year a number of major extensions of capacity were carried a stage further, notably at Barker and Allen, and in the sheet mill, zinc mill, foundry, Encon and engineering depts. at Enfield. Explaining the Alenoy link with Aluminium Ltd., Lord Verulam said this became necessary because of the attack on the UK secondary market by the world's virgin aluminium producers.

Ever Ready Trust

Dividend is raised from 18% to 21% and the directors propose a one-for-two scrip issue. Pre-tax earnings for the year to 31 March are £157,041, against £132,862 previously, and net profit is £67,290 (*£64,824*). There was also a profit on exchange of investments amounting to £114,252, £95,000 being appropriated to capital reserve. This reserve now stands at £510,000, of which the scrip issue will absorb £300,000.

Glenfield and Kennedy

Profit before tax is almost steady at £541,458 (£558,885 in 1959) and dividend is again 20%. A tax credit of £70,659 and non-recurring profit on the sale of the Polmadie undertaking result in net profit being considerably higher at £431,536, compared with £326,773 previously.

Hopkinsons

Dividend raised by 5% to 27½% although profit is slightly lower at £1,056,792 before tax (previously £1,095,923) suggests that work in hand is at a high level, with boiler mountings, instruments and valves in demand for power projects. After tax, net profit is £544,092 for the year to 31 Jan. (previously £575,423).

Kango Electric Hammers

A record year produced £63,999 net profit in 1960 against £46,064 previously. Dividend is raised to 20% from the 17½% paid in 1959, which included a 2½% jubilee bonus.

Laurence Scott and Electromotors

Dividend is maintained at 15% although profit fell from £1,122,674 to £872,167 before tax. After tax of £300,000 (£410,000) the net balance is £310,719 against £415,322.

F. McNeill and Co.

A £100,779 trading loss on the cable side of the business, comprising General Cable Mfg. Co., and Britannic Cables, more than offset profitable trading on roofing contracting and other activities. Group trading loss was £20,787, contrasting with a profit of £85,019 made in 1959. Dividend is cut by an effective 5%, with the 1960 payment totalling 10%.

A. Reyrolle

As a result of the inflow of orders which began in the second half of 1960, the works will be fully employed for the next 12 months, Mr H. H. Mullens states in his annual report. But overall, 1960 was a difficult year with serious short-time working in the first half, and the higher profit was partly due to the completion of a number of large contracts. Competition continues to grow in severity, but pointers to the future are the expected revival in capital expenditure by the steel and motor industries, the trend towards larger generating sets, for which Reyrolle are well equipped to manufacture e.h.v. circuit-breakers, and plans to retain markets in certain countries by manufacturing locally. In line with the latter policy, a nucleus of technical and production personnel will go to Melbourne within a few weeks to set up manufacture there in conjunction with Oliver J. Nilsen (Australia). Turning to nuclear projects, the chairman says most of the equipment for Bradwell has been delivered to site and the company's engineers are doing the final installation work on the first reactor. It is expected that the loading of this reactor with fuel will begin within the next month. Manufacture of equipment for Latina station in Italy is well advanced. It is still too early to say how profitable or otherwise nuclear activities will be, the chairman states.

Year to 31 Dec.	£ Trading Profit	£ Net Profit	% on Ord.		Ord. Price	
			Earned	Paid	High	Low
1956	2,907,102	1,256,825	53·5	17½	112/3	81/-
1957	3,198,165	1,353,086	50·5	17½	112/6	70/6
1958	3,292,649	1,358,257	50·7	17½	98/-	73/6
1959	3,133,788	1,428,021	50·1	17½	98/6	84/-
1960	3,601,539	1,560,306	*27·4	9½	52/6	32/6

*On increased capital

Wm. Sanders and Co. (Wednesbury)

Dividend is raised from 25% to 30%, with preliminary profit up from £35,908 to £42,202, subject to £20,763 tax (previously £17,718).

Southern Areas Electric

Trading experience among the subsidiaries in 1960 was variable. Generally, marine business was slack, but demand for industrial electrical equipment and for machines and tooling was good. Development of the "Mawdomatic" crane control has contributed to an improving flow of orders for the Mawdsley subsidiary, which started 1959 with a short order book. Higher wages and shorter working hours combined with pressure on margins dissuade the chairman from predicting the future, but orders on hand at the end of March, 1961, were 124% higher than at the beginning of 1959.

Telephone Rentals

Net profit is up from £837,503 to £990,012 and dividend is held at 15% for 1960, while directors also declare a 2½% interim for 1961 and propose a one-for-five scrip issue.

John Thompson

Berkeley nuclear station is casting its shadow on another company's results. Directors warn shareholders that the group incurred a "substantial loss" in 1960 and a final dividend is unlikely to be paid. They explain that losses on Berkeley and another contract were greater than expected and, although these contracts are not quite completed, they consider it prudent to charge these losses against 1960 results, thus reversing what would otherwise have been a normal profit. However, the order book is healthy and directors expect encouraging profits in the future. Net profit after tax in 1959 was £324,311 and full distribution was 20%, including a final 12½%. An interim 5% has already been paid for 1960.

Dividends Declared

Cable and Wireless. First quarter 1½d, against an equivalent 1¼d for the first quarter of 1959 before a scrip issue.

GEC. Second interim 7%, making a steady 10% for the year.

OVERSEAS NEWS

from our correspondents abroad

CANADA

Alternative Columbia Proposals

Alternative financial proposals for development of the Columbia River were submitted towards the end of last month by Premier Bennett to the Canadian Government. Under his first proposal, the Government of Canada would be required to construct storage dams and transmission lines to fulfil the requirements of the Columbia River treaty, to grant generous compensation to BC citizens affected by flooding and to pay $64 million as a flood control indemnity to the BC Government, these earnings to be used only as compensation for economic loss as a result of flooding. The Canadian Government would also assume responsibility for $4 million pre-engineering costs on the scheme. After 50 years' ownership, all works and transmission lines would revert to the BC Government, or at an earlier date if the construction works were paid for.

The alternative proposition was that the BC Government should undertake full financial and fiscal responsibility for construction, allowing the Government officials full access to engineering data. The Government of Canada was, under these conditions, asked to guarantee that the net cost of power delivered to the Vancouver area would not exceed 4·25 mills/kWh and also that the US authorities should guarantee purchase of any BC surplus power at a price not less than 4·25 mills/kWh.

BC Hydro Seeks Export Licence

A licence to export surplus and interruptible power to the US for a five-year period has been applied for by BC Power Commission. The application has been made to the National Energy Board, although at a recent hearing of a similar application, by BC Electric, the utility opposed the granting of a licence. The objection was based on the grounds that such an agreement might conflict with arrangements made for the US-Canadian development of the Columbia River.

Fair Price for BCE Shares

The chairman of BC Power Corporation, parent company of BC Electric, said recently that, in his opinion, the Government would pay a good price for shares, in the event of a takeover, to maintain investor confidence. He said the Federal Government had provided that half the Federal Corporation's income-tax on investor-owned utilities was to be returned to the provinces. But the British Columbia Government complained that it was not getting half. This was one reason given by Premier Bennett for a possible takeover of BC Electric.

Peace Project Delayed

The Peace River power scheme will not go ahead until after the BC Energy Board issues its report in August and subsequently it is likely to be on a smaller scale than originally proposed. President of the Peace River Power Development Co., Mr W. C. Mainwaring, said recently that nothing can be done until the report is issued and that work would probably start with the smaller of the two proposed dams.

SOUTHERN RHODESIA

Kariba Power for Bulawayo

Power from the Kariba dam is expected to be available in Bulawayo this month. The power will meet half the city's requirements, the remainder being met by the existing thermal station.

S. AFRICA

Railway Electrification

The continuing programme for the electrification of South African Railways is expected to cost about £308,000 this year. Work on the Touws River, Beaufort West section, is now practically completed.

Uranium Refinery Commissioned

At the recent opening of a uranium refining pilot plant in Johannesburg, the atomic energy board director, Dr Roux, said the plant would provide basic information for production of uranium metal and salts and would, for the first time, enable South Africa to produce uranium suitable for use in nuclear power reactors. The Minister for Mines commented that the plant would help South Africa to sell uranium in a variety of forms, for, as a result of over-production in overseas markets, the once lively market for South African uranium had slackened. The plant is designed to treat 100 tons of uranium each year.

Orange River Development

A scheme for development of the Orange River is expected to be submitted to the South African cabinet later this year. The scheme includes a 100 MW hydro-electric plant, but because of the nature of the river's water course, a single dam would not be economical and several would probably be required. Development, which would include extensive irrigation schemes, would probably take place in six phases.

PAKISTAN

Nuclear Consultants Arrive

Three representatives of the Inter-Nuclear Co. and Gibbs and Hill arrived in Karachi recently to examine the prospects for nuclear development. These two firms have been appointed as nuclear consultants by the Pakistan Atomic Energy Commission.

INDIA

Third Plan Target Raised

Target for the Third Plan has been provisionally raised from 11·8 million kW to 13·4 million kW. This was announced recently by the Deputy Minister for Irrigation and Power and follows a previous statement reported in the ELECTRICAL TIMES for 30 March, 1961. The Government also proposes to establish river boards to investigate planning in the seven major basins: Sutlej-Ravi-Beas, Jumna, Narmada, Tapi, Mahi, Godavari-Krishna and Cauvery. The Deputy Minister said that the water resources of the country were estimated at 40 million kW, adequate for the country's needs and, by the end of the Third Plan, about 5·3 million kW would be exploited. A further 80,000 miles of transmission lines would be added under the plan, bringing the total to 158,000 miles by the end of March, 1966.

Power Agreement Signed

Under an agreement signed in New Delhi between the US and Indian Governments, Rs46 crore will be used for power development. The loans will cover costs of thermal stations at Chandrapura (Rs20·5 crore) and Barauni (Rs1·3 crore); a hyrdo-electric scheme at Barapani (Rs6·4 crore); extensions to the Durgapur and Kanpur thermal plants at costs of Rs3·4 crore and Rs95 lakh, respectively.

Chenab May Yield 300 MW

Speaking recently, the deputy Minister for power and irrigation said there was a possibility that harnessing the waters of the Chenab River would yield 300 MW. In ELECTRICAL TIMES for 2 March it was reported that a survey of the river was in progress.

Calcutta Power Crisis

Power supplies to domestic consumers in Calcutta have been cut recently because of the inability of the DVC power station at Durgapur to meet the demand. The restrictions are likely to continue for two or three months, according to the corporation. This new crisis was caused by a series of accidents at the DVC plant and the failure of a 50 MW generator operated by the Calcutta Electric Supply Corporation. The general manager of DVC said power demand

was so great that two more power plants would be necessary during the Third Plan period. A State Electricity Board report forecasts a power deficit of 700 MW by 1966.

State Grid Under Third Plan

An inter-State transmission link connecting the power systems of the southern States of Andhra Pradesh, Madras, Mysore and Kerala is expected to be undertaken under the third Five-year Plan, according to the Deputy Minister of Irrigation and Power. Network analyser studies of the systems in the individual States have been made and a combined study of the four State power network is in progress.

JAPAN

Eight-year Power Plan

For the eight years to 1967, the Japanese Government has embarked on a development plan aimed at increasing electric generation by 27,220 MW. Estimated power requirements at the end of the period are put at twice that for last year.

Tokyo Nuclear Station

The site has been provisionally selected for a nuclear power station of 170 MW output. The station will constitute part of the Tokyo Electric Power Co.'s plans for nuclear generation amounting to 1,000 MW.

AUSTRALIA

Switchgear Agreement

An agreement for collaboration in the manufacture of high voltage switchgear and ancillary equipment in Australia has been signed by A. Reyrolle and Co. Ltd. with Oliver J. Nilsen (Australia) Ltd. It is proposed to form a new company, Reyrolle Nilsen (Australia) Ltd., with offices at 45 Bourke St, Melbourne, Victoria, and an authorised capital of £500,000. The company will undertake progressive manufacturing stages for switchgear in a factory to be established at Melbourne with a nucleus of Hebburn-trained staff. Intitially h.v. switchgear will be assembled and partly manufactured at this factory.

Ship Mooring by Magnet

The Australian coastal shipping commission is investigating the possibility of making large electromagnets to fasten ships alongside wharf berths. If the magnetic system is developed, it will probably be used for ships on the run between Melbourne and Tasmania.

Barron Falls Progress

Concrete flooring for the large 60 MW powerhouse associated with the £11 million Barron Falls hydro-electric project in northern Queensland is expected to begin shortly. An access tunnel 360 ft long has been driven into the side of the river gorge to the power station site, which will be 146 ft long, 40 ft wide and 86 ft maximum height. The Barron Falls scheme is scheduled for completion by 1963.

Hazelwood Tenders

Tenders will shortly be called for by the State Electricity Commission of Victoria for the second stage of Hazelwood power station. Capacity of this stage will be 400 MW, as for the first stage. It is scheduled to have its first generator in service by 1967 and the second by 1968.

Rail Plan for Adelaide

Recommendations for an extensive system of rail routes in Adelaide district are contained in a report published by the South Australian branch of the Australian Electric Traction Association. The long-term plan, covering five phases, includes recommendations for the immediate purchase of land routes and, in 15 to 20 years, the building of an underground rail system in the city to be completed in 25 years.

Power Line Works Begin

Work has begun on the erection of a £34,000 h.t. line extending 30 miles to MacDonald Valley, near Wiseman's Ferry. The work, being undertaken by Prospect CC, should be completed by the end of June. The consumers have agreed to meet part of the costs.

Queensland Industrial Plan

The Queensland State Cabinet has approved an agreement with Theiss Bros. giving them permission to develop the Kianga coalfield. The company plans to export coal to Japan over a new 110-mile electric railway to be constructed within the next five years. Finance for the railway will be obtained from the company's Japanese partners. Industrial development in Central Queensland now makes almost certain the construction of a power house, possibly on the Callide coalfield, while another may be built on the West Moreton field to feed the south eastern grid. It has now been found uneconomical to run a power line from Central to South Eastern Queensland, where the majority of consumers are.

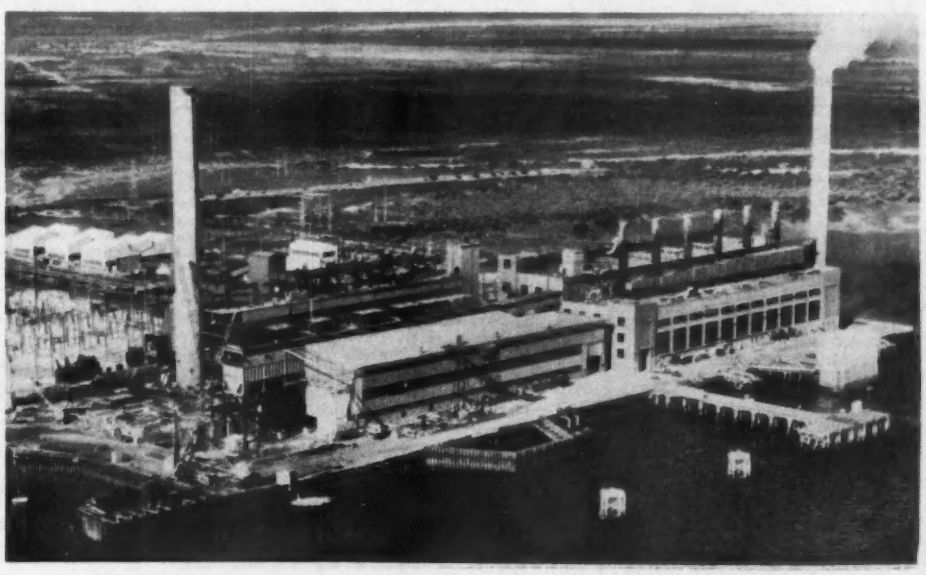
NEW ZEALAND

Aviemore Hydro Scheme

Construction work at Aviemore, the site for the 200 MW hydro-electric station on the Waitaki River, will probably begin next year. The station, which will be downstream of the Benmore hydro station, is scheduled for completion in 1968. Investigations for a hydro-electric scheme on the upper Waitaki River are under way with the object of constructing three power stations at Maryburn, Lake Pukski and on the Ohau River at Lake Benmore.

PORT AUGUSTA STATION

The second of the two 60 MW sets at the Port Augusta "B" station was commissioned on 22 March. The station, also known as the Sir Thomas Playford station, has been built by the Electricity Trust of South Australia to supply power to Adelaide and the Whyalla steel mills. The generator sets are hydrogen-cooled and were built by the English Electric Co.



COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

27 April—Cardiff C.C. Electrical installation, on fixed-price basis, in Fairwater County Primary School.—See 13 April issue.

27 April—Galway. (b) Electrical installation comprising 160 lighting points, 151 power sockets, 18 power points, 25 socket-outlets, radio and burglar alarm systems in new factory.—See 20 April issue.

27 April—Manchester C.C. Contract 357. Electrical installations in 20 maisonnettes.—See 20 April issue.

27 April—Scunthorpe B.C. Rewiring of 238 pre-war houses, Crosby.—See 13 April issue.

27 April—Smethwick C.B.C. Electrical installations in (1) stadium and (2) gymnasium blocks at Hadley Playing Fields, Waterloo Rd. Applications to Borough Engineer and Surveyor, Council Hse, by above date.

28 April—Beddington and Wallington B.C. 161 concrete columns/brackets with 60 W sodium lamps/gear; resiting of three columns and supply/erection of two 200 W sodium lamps on 25 ft steel columns.—See 20 April issue.

28 April—E.B. for N. Ireland. Specification N.I.1733. Two 30 MVA and two 15 MVA 110/33 kV transformers for Finaghy and Dungannon substations. Details from consulting engineers: Kennedy and Donkin, 12 Caxton St, S.W.1. Deposit £5 5s. Applications by above date.

28 April—Glasgow Northern Hospitals. Supply: electrical fittings.—See 20 April issue.

28 April—Redcar B.C. Erection of A.E.I. post-top lanterns on Stanton concrete columns along Coatham Enclosure, Access Rd and Promenade extension. Borough Engineer, Ridley Hse, Coatham Rd.

29 April—Dunbarton C.C. Supply: 60 and 140 W sodium jackets; 60 and 100 W tungsten; and fluorescent lamps.—See 20 April issue.

29 April—Glasgow C.C. Electrical work at Easterhouse Secondary School. Applications to City Architect, 20 Trongate, by above date.

29 April—Heywood B.C. Supply of: (1) sodium, tungsten, mercury fluorescent and fluorescent lamps; (2) 60 W sodium lanterns; (3) controllers. Street Lighting Superintendent: W. Theaker, Market Hall, Hind Hill St.

29 April—Margate B.C. Electrical installations, houses and flats, Millmead Rd—Stage 1.—See 20 April issue.

29 April—Otley U.D.C. 50 Group "A" tubular steel columns/brackets, lanterns, lamps, gear and wiring of 250 W and 400 W colour-corrected mercury lighting along Pool Rd.—Advertised 6 April issue.

29 April—Staffordshire C.C. Supply of (a) demonstration equipment for electrical laboratory; (b) chemical laboratory major equipment; and (c) X-ray apparatus.—Advertised 23 March issue.

29 April—Staffordshire C.C. Supply: batteries and battery chargers.—Advertised 30 March issue.

1 May—Birmingham Tame and Rea. Medium voltage switchboard.—See 20 April issue.

1 May—Cheadle and Gatley U.D.C. 19 Group "A" columns and m.v. lanterns along Church Rd.—See 20 April issue.

1 May—Clyde Navigation Trust. Supply of (9) cables and (10) lamps for year. Stores Superintendent, No. 1 Graving Dock, Glasgow S.W.1.

1 May—East Devon Water Board. Duplicate pumps for a total of 1,500 g.p.h. at 190 ft head.—See 20 April issue.

1 May—Ipswich C.B.C. Electrical installation in St. Mathew's Baths.—Advertised 30 March issue.

1 May—Lurgan. Electrical wiring and heating installation, church hall at Shankhill.—See 13 April issue.

1 May—Newtownards B.C. (a) Electrical installation in Queen's Hall extensions. Details from consulting engineers: A. K. McAuslan and Ptnrs., 16 Bedford St, Belfast 3. Deposit £3 3s.

1 May—Renfrew C.C. (6) Electrical work in erection of 40 houses at Neilston. County Engineer, 16 Back Sneddon St, Paisley. Applications by above date.

1 May—Westmeath C.C. Electrical installation in sanitary annexes at St. Mary's Hospital—See 13 April issue.

1 May—Worksop R.D.C. Duplicate 150 g.p.m. sewage pumps complete with motors, starters and accessories.—See 6 April issue.

2 May—Eston U.D.C. 49 street lighting units along South Bank Trunk Rd.—See 20 April issue.

2 May—Manchester C.C. Supply: 1,000 85 W sodium lanterns/gear and 650 traction pole bracket sleeves.—See 20 April issue.

2 May—Manchester C.C. Supply: lamps for vehicles.—See 20 April issue.

2 May—Newry No. 2 R.D.C. Duplicate 25 g.p.m. at 335 ft head pumps for Tullymacreeve Station.—See 30 March issue.

2 May—West Riding C.C. (4) Part rewiring of Horsforth Springfield Special School; (6) lighting improvements at Bingley Secondary School; (7) rewiring of Swinton Bridge Junior Mixed and Infants' School; (9) rewiring of Featherstone George St School; (10) rewiring of Pontefract C.E. Girls' School.—See 13 April issue.

3 May—Cardiff C.C. Electrical installation, etc., in Assembly Hall and servery at Fairwater County Primary School, Bwlch Rd, and Greenway Infants' School, Barmouth Rd.—See 20 April issue.

3 May—Manchester C.C. Two passenger/goods lifts at Central Technical College; two passenger lifts; and electrical engineering services in Elizabeth Gaskell College Hostel.—See 13 April issue.

4 May—Altrincham B.C. 118 20 ft concrete columns, 60 and 85 W sodium lamps/lanterns/gear.—See 20 April issue.

4 May—Belfast C.C. (a) Electrical installation in Tower St Institute for Further Education.—See 6 April issue.

4 May—Coventry C.C. Supply: lamps and accessories.—See 20 April issue.

4 May—N. Ireland. Supply of lamps for year for Government establishments. Room 103, Law Courts Bldg, Belfast 1.

4 May—Northwich R.D.C. Electrical installations in eight dwellings off Grange Rd, Cuddington, and 28 dwellings off Wessex Drive, Rudheath.—See 13 April issue.

5 May—Lancashire C.C. Rewiring of: Hindley Green County Secondary School, Urmston Grammar School and Worsley Walked C.E. School. Applications to County Architect, P.O. Box 26, County Hall, Preston, by above date.

5 May—Tyrone C.C. Electrical installation in new county H.Q.—See 6 April issue.

6 May—Kirkcaldy T.C. Supply: electrical goods; fittings; columns; lamps; and cables.—See 20 April issue.

8 May—Morecambe and Heysham B.C. Electrical installations for 85 market stalls, Poulton Hall Market. Borough Engineer and Surveyor. Deposit £1.—Advertised in this issue.

8 May—Rochester C.C. Electrical installations, on fixed-price basis, in 32 houses (Section II), Maidstone Rd estate. City Surveyor: A. Peel, 66 Maidstone Rd. Deposit £2 2s.

8 May—West Suffolk E.C. Supply of lamps for year. Chief Education Officer: F. J. Hill, Manor Hse, Bury St. Edmunds.

9 May—Athlone U.D.C. Duplicate 52,000 g.p.h. at 40 ft head pumps.—See 6 April issue.

9 May—Hebburn U.D.C. (2) Electrical installations in 24 flats and 24 maisonnettes.—See 13 April issue.

9 May—Willesden B.C. (a) Supply of 15 140 W and 261 60 W sodium lighting units/gear; (b) supply and erection of 15 25 ft concrete columns and 261 15 ft columns, wiring and fixing of lanterns/gear.—See 13 April issue.

10 May—Bath C.C. Contract 6. Electrical installations in two four-storey blocks of 16 flats and three pairs of houses on Tiverton/Whiteway estate. City Planning Officer and Architect, 7 North Parade Bldgs. Deposit £2 2s. Contractors to be on N.I.C.E.I.C. roll.

10 May—Tycor, Waterford. Electrical installation, comprising h.t. and l.t. switchgear, cables, motive power and lighting for Munster Chipboard Ltd. Documents from consulting engineers: Lyons, Boland and MacArdle, 45 Dartmouth Sq, Dublin 6. Deposit £26 5s.

12 May—Blackpool C.B.C. Pumps for central area drainage.—See 20 April issue.

12 May—Enniskillen R.D.C. Electrical installation in new council offices, etc. Clerk, Cornagrade. Deposit £5 5s.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 112 queries answered this week

"Nelson-Brooks" fan and ventilating equipment—makers of? E.C.—Brooks Ventilation Units Ltd., Trafalgar Hse, Bedford Park, Croydon, Surrey.

"B.N.E." cookers—address for spares? M.A.N.W.E.B.—Johnson and Phillips Ltd., British National Electrics Division, Aurora Wks, Old Kilpatrick, Glasgow.

"Bustler" vacuum cleaners—repairers and suppliers of motors for? W.H.P.—H. Miller and Co. Ltd., Aston Brook St, Birmingham 6.

"Darling" sewing machines—agents for? Y.E.B.—Turissa (Great Britain) Ltd., 101-109 Ladbroke Grove, W.11.

"Aesculap" hair clippers—agents for? S.E.B.—Perlex Co. Ltd., 51 Tottenham Court Rd, W.1.

"Efteelite" lighting fittings—makers of? B.R.—Fredk. Thomas and Co. Ltd., 18-26 Everton Bldgs, Stanhope St, N.W.1.

"Wormald" pre-payment meter locks—makers of? E.D.—Wormald Patent Locks Co. Ltd., 139 Norfolk St, Sheffield 1.

"Tawlite" lighting fittings—makers of? T.E.—The Taw Manufacturing Co. Ltd., Campsbourne Wks, High St, Hornsey, N.8.

"Metamec" clocks—makers of? O.C.—Metamec Ltd., South Green, Dereham, Norfolk.

"Lido-Solet" sun-ray lamps—address for? L.E.B.—Tellux Ltd., 44 Brunel Rd, W3.

15 May—Ayr C.C. Supply of lamps. County Clerk, Supplies Dept., County Bldgs, Ayr.

15 May—Barr. Electrical installation in new Primary School. Details from architects: McLean and Forte, 29 The Mall, Newry, Co. Down. Deposit £5 5s.

15 May—Burton Latimer U.D.C. 28 Class "A" steel columns with mercury vapour lanterns.—Advertised 20 April issue.

15 May—Chester C.C. Supply of lamps for 11 months.—See 13 April issue.

15 May—Newcastle upon Tyne C.C. Electrical installation, baths and laundry, Montagu estate.—See 16 March issue.

15 May—N. Ireland. Electrical installation in Jonesboro' Primary School extensions. Details from architects: McLean and Forte, 29 The Mall, Newry, Co. Down. Deposit £5 5s.

15 May—Rowley Regis B.C. Supply and erection of 545 Group "B" concrete columns/lamps/equipment. Borough Engineer and Surveyor: S. G. Wood, Municipal Bldgs, Old Hill, Staffs. Deposit £2.

16 May—Maghera. Electrical installation in St. Patrick's new Voluntary Intermediate School. Details from architects: Corr and McCormick, 7 Ferryquay St, Londonderry. Deposit £26 5s.

17 May—Co. Tyrone. Electrical installation in Drumquin new Primary School. Details from architects: Corr and McCormick, 7 Ferryquay St, Londonderry. Deposit £5 5s.

19 May—Plymouth C.C. Provision of illuminations scheme.—See 20 April issue.

24 May—Cheltenham B.C. (1) Supply of 64 60 W and 42 45 W sodium lanterns/gear; (2) supply and erection of 106 fluted steel columns and fitting/wiring of lighting. Borough Surveyor: W. E. C. Bird, Municipal Offices.—Advertised in this issue.

30 May—Kirkham U.D.C. Supply, erection and installation of 14 Group "B" concrete columns and 80 W mercury vapour lighting/gear/wiring along Freckleton Rd. Surveyor, Council Offices. Deposit £2 2s.

6 June—Dartford Tunnel. (4) Electrical distribution, lighting, tunnel services and pumping installations for M. of Transport. Details from consulting engineers: Mott, Hay and Anderson, 9 Iddesleigh Hse, Caxton St, S.W.1. Deposit £50.

12 June—E.B. for N. Ireland. 25,000 g.p.m. pumps.—See 6 April issue.

19 June—E.B. for N. Ireland. Specification NI 1633. Supply and erection of one 4 MVA 11·8/3·5 kV unit transformer for Coolkeeragh.—See 20 April issue.

No date stated—Bristol C.C. Electrical work in boiler and heating installation, College of Commerce.—See 23 March issue.

No date stated—Dunbarton C.C. 25 lighting fittings and equipment for Garelochhead street lighting.—See 20 April issue.

No date stated—Loch Lee Water Board. 1½ mile relay cables and lighting/power wiring at Loch Lee.—See 20 April issue.

No date stated—N. of Scotland H.E.B. 54 mile 275 kV double-circuit transmission line between Crauchan and Windyhill.—Advertised 13 April issue.

No date stated—Norwich C.C. Street lighting improvement schemes involving eight roads.—Advertised 20 April issue.

No date stated—St. Johnstone Football Club. Erection of floodlighting and covered enclosure.—See 20 April issue.

No date stated—Sheffield C.C. Waterworks. Supply and installation of 11/3·3 kV and 3·3 kV/415 V transformers, 3·3 kV air break switches, 3·3 kV contactor starters, etc., for Yorks Derwent Scheme.—Advertised 30 March issue.

No date stated—Southport Hospital Committee. Applications invited for inclusion in work list.—See 13 April issue.

No date stated—Swinton and Pendlebury B.C. Electrical installations in 94 dwellings. Borough Engineer, Town Hall, Swinton.

. . . and Overseas

Details of items marked • may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.

6 May—Iraq. Construction of power station at Chuarta Town of Sulaemaniya Liwa. Secretary, Tenders and Purchase Committee, Ministry of Municipalities. B.o.T. (ESB/12955/61).•

9 May—America. Supervisory control and telemetering switchboards for Jamestown and Morris substations; two carrier current transmitter/receiver sets. Dept. of the Interior, Bureau of Reclamation, Bldg 53, Denver Federal Center, Denver 25, Colorado. B.o.T. (ESB/12856/61).•

9 May—America. One 6,900/480 V 500 kVA metal enclosed substation, one 480 V duplex control centre, distribution board, battery charger, inverter set, control equipment and spares. District Engineer, U.S. Army Engineer District 628, Pittock Block, Portland 5, Oregon. B.o.T. (ESB/13127/61).•

10 May—Pakistan. Conductors, insulators and kWh meters (15 items). Director of Purchase, Water and Power Development Authority, Munshi Chmbrs, Old Anarkali, Lahore. B.o.T. (ESB/12924/61).•

10 May—Pakistan. Twin 1/·044 and 1/·029 c.t.s. wire. Director of Supply, P.I.D.C. Hse, Motijheel, Dacca. B.o.T. (ESB/13175/61).•

11 May—Pakistan. One 2·5 cu secs at 460 ft head and one 2·5 cu secs at 250 ft head submersible pumps and one centrifugal pump for 2·5 cu secs at 250 ft head. Director of Purchase, Water and Power Development Authority, Munshi Chmbrs, Old Anarkali, Lahore. B.o.T. (ESB/12925/61).•

19 May—S. Africa. 54 cordless P.B.X. telephone switchboards and 200 magneto telephone bells. Town Clerk, City Hall, West St, Durban. B.o.T. (ESB/13188/61).•

23 May—America. Three 47 MVA 138/11·2 kV transformers. Dept. of the Interior, Bureau of Reclamation, Bldg 53, Denver Federal Center, Denver 25. B.o.T. (ESB/13185/61).•

24 May—Malaya. Pipework, tanks, pumps and ancillary plant for Johore Bahru Power Station. Contract EE.1737/3. Details from Crown Agents, 4 Millbank, S.W.1.

9 June—Nigeria. 21,000 s.ph. house-service meters, delivered 1,750/month, to Electricity Corporation of Nigeria. Details from Liaison Officer, Adelphi, John Adam St, W.C.2.

12 June—India. Tender SE.364. 138 kV c.b's for D.V.C. Chandrapura Thermal Station. Details, fee £1 1s 5d, from India Store Dept., Government Bldg, Bromyard Ave, Acton, W.3. Viewing reference S.4099/60/NSC/ENG.2.

21 June—India. (1) Two 1 MVA 3-ph. 110/11 kV transformers; (2) two 115 kV group operating switches (horizontal type), fusible disconnects and four units 11 kV outdoor switchgear. Enquiry PC/MSEB/165/Part A (for 1) and B (for 2) 60-61. Purchase Officer, M.S.E.B., P.B.15, Bangalore.

7 July—New Zealand. Two 10 MVA 33/11·55/6·6 kV transformers for Mosgiel substation. Town Clerk, P.O. Box 5045, Dunedin. B.o.T. (ESB/13162/61).•

18 July—New Zealand. 1,385 steel transmission line towers. Secretary, Tenders Committee, N.Z. Electricity Dept., Wellington. B.o.T. (ESB/10890/61).

19 July—Nigeria. Supply and erection of 32·25 mile 33 kV transmission line complete with substation at Abeokuta and additional equipment at Shagamu substation. Secretary, E.C. of Nigeria, Private Mail Bag 2030, Lagos. B.o.T. (ESB/11484/61).•

CONTRACTS PLACED

C.E.G.B. Contracts placed in March, amounting to £12,742,700, include: Kearsley power station: ash handling equipment, Bennis Combustion Ltd.—Thorpe Marsh power station: one 550 MW reheat turbo-generator (No. 2) and boiler feed pump, Associated Electrical Industries Ltd.—West Burton power station: power supplies for erection purposes, East Midlands Electricity Board; preliminary civil engineering works, Mitchell Construction Co. Ltd.—Drakelow "C" power station: two 400 MVA generator transformers, units Nos. 9 and 10, Associated Electrical Industries Ltd.; 3·3 kV auxiliary switchgear, units Nos. 9 and 10, A. Reyrolle and Co. Ltd.; six cooling towers, Film Cooling Towers (1925) Ltd.; two 50 MVA 132/11·6 kV station transformers Nos. 3 and 4, Yorkshire Electric Transformer Co. Ltd.—Bankside power station: 60 MW turbo-generator set No. 3 with associated condensing and feed heating plant, Associated Electrical Industries Ltd.—West Thurrock power station: condensing plant for two 300 MW turbo-generator sets Nos. 3 and 4, Worthington-Simpson Ltd.—Barrow main substation: two 45 MVA transformers, Johnson and Phillips Ltd.—Paignton substation: two 60 MVA 132/33 kV transformers and auxiliary transformers, Associated Electrical Industries Ltd.—Blyth "B" power station: 16 kV and lower voltage cables and accessories, Pirelli-General Cable Works Ltd.—Barking-Brunswick Wharf-West Ham: 132 kV cables, W. T. Glover and Co. Ltd.—Cowes, Isle of Wight: 33 kV cables, British Insulated Callender's Cables Ltd.

Newcastle upon Tyne Hospital Board. Electrical work in hospitals: Prudhoe and Monkton, Campbell and Isherwood Ltd., £8,398, and J. Scott Ltd., £13,570; West Hartlepool General, C. Horne and Co. Ltd., £2,517; Poole Hospital, Doves Ltd., £5,548.

Stockton-on-Tees T.C. Electrical installation new Fairfield S.M. School, Williams Bros., £3,600 17s.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Adamin. 811,077. Class 9. Soldering irons. Light Soldering Developments Ltd., 28 Sydenham Rd, Croydon.

Atlas-Truflood. 802,708. Class 11. Lamps, etc. Thorn Electrical Industries Ltd., 105-109 Judd St, W.C.1.

Heligear. 808,139. Class 7. Gear boxes, geared motors, etc. Opperman Gears Ltd., Hambridge Wks, Hambridge Rd, Newbury.

Penguin. 809,560. Class 7. Cutting, beating, grinding machines, etc. Kitchen Machines Ltd., St. Andrew's Hse, 32-34 Holborn Viaduct, E.C.1.

PEP in design. B788,415. Class 7. Pumps. Precision Electrical Products (Stockport) Ltd., Progress Wks, Lytham St, Cale Green, Stockport.

Redifax. 813,488. Class 9. Apparatus, etc. Redifon Ltd., Carlton Hse, Lower Regent St, S.W.1.

TRADE NOTES

Servicing. Following a serious fire at the Norwood depot, Cossor Radar and Electronics Ltd. have transferred their Servicing Department to Edinburgh Pl, Temple Fields, Harlow, Essex. Telephone: Harlow 25537.

Extension. The Manufacturers Equipment Co. Ltd. have opened a new office block at Sutton Rd, Hull. Telephone: Hull 13996.

New Factory. David Brown Industries Ltd. are negotiating to lease a factory on the Pallion Trading Estate, Sunderland.

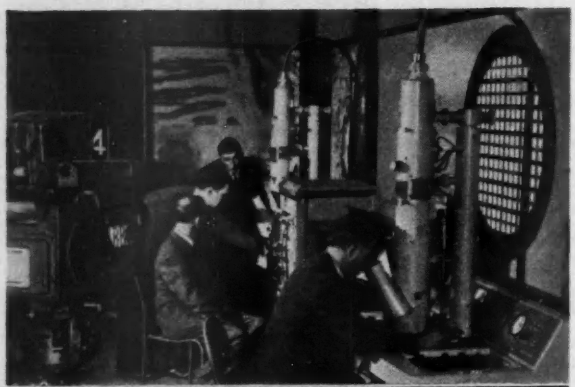
Screw Centre. Guest, Keen and Nettlefolds (Midlands) Ltd. are opening a Technical Centre at their Screw Division to show, under one roof, all the different screws, nuts, bolts, etc., made by the Division. It is to be officially opened at Heath St, Birmingham 18, on 26 May.

REPORT ON COMPANY MEETING OF ASSOCIATED ELECTRICAL INDUSTRIES LIMITED 1960

In any general expansion of industry or national prosperity...

THE ELECTRICAL INDUSTRY MUST BE IN THE FOREFRONT

Lord Chandos Chairman of Associated Electrical Industries



An electron microscope and the image intensifier. First of its kind, the image intensifier presents on a television screen a greatly intensified image of the specimen.

Reviewing the financial results for the year 1960, Lord Chandos, Chairman, at the Annual General Meeting, said: The trading profit, after tax, was virtually unchanged at £4,722,000 compared with £4,747,000 last year.

The total Stockholders' capital employed in the business is £138,906,000, the equity capital is £133,120,000, against the nominal figure of £42,828,000. The 3/- Ordinary dividend represents a return on the equity capital of slightly under 5%.

TURNOVER UP—RECORD ORDER BOOK 1960

The order book is a record. Compared with last year the orders received increased from £182m. to £223m. Our turnover increased from £208m. to £215m., and orders in hand have increased from £173m. to £181m.

The volume of exports by the electrical and allied industries amounted to no less than £293m. in 1960, and this represented 10% of the total export manufactured goods from the United Kingdom. A.E.I. has made a notable contribution to this figure, and there has been a small increase of about £3m. in the value of A.E.I. exports over the corresponding figure for 1959.

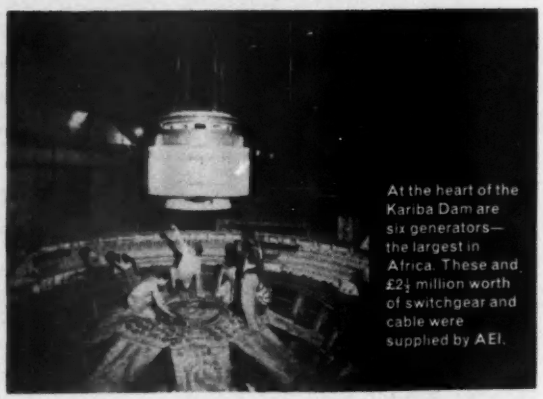
LEADING WORLD EXPORTS OF STEAM TURBINE GENERATORS

After reviewing the Group's manufacturing operations overseas, Lord Chandos said: Exports, in a country of 53 million people, with meagre indigenous resources of raw materials, are vital to the economy. It is rather a striking fact that in 1960 AEI's total export orders for steam turbo-alternators was more than that of any individual manufacturer in the world, and greater than those of all the other manufacturers in this country put together. We are naturally striving to ensure that this situation will continue, but even if it does not, I think an occasional toot on our own trumpet is not out of place. The export business has been highly competitive, margins have been inadequate and these conditions are likely to continue in 1961.

Prospects for 1961

I cannot see any general expansion in industry or in national prosperity, either in this country or in any other, unless the electrical industry is in the forefront of the growth.

The outlook for those parts of our business which are predictable is much better than it was in 1960, and I expect more favourable results in 1961 from the majority of our Divisions. We regard the longer future with undiminished confidence.



At the heart of the Kariba Dam are six generators—the largest in Africa. These and £2½ million worth of switchgear and cable were supplied by AEI.

15 PRODUCT DIVISIONS AND PRINCIPAL TRADING COMPANIES IN THE U.K. AND MORE THAN 20 COMPANIES OVERSEAS

Associated Electrical Industries Limited AEI

(Advertisement)

BUSINESS PROSPECTS

Ashington. Newcastle Hospital Board propose maternity unit, Ashington Hospital. Board architect, Benfield Rd.

Ashton-under-Lyne. Ten-year major development plan at Ashton General Hospital proposed by Manchester Regional Hospital Board, Cheetwood Rd, Manchester 8.

Basildon. Walkins and Park, Town Sq, architects for proposed Commercial Vehicles Repairs (Essex) Ltd. factory, Cranes Close.

Billingham U.D.C. Proposed: 40 old people's two-roomed houses. Surveyor.

Birmingham. Tersons Ltd., Dollis Park, N.3, awarded £258,000 contract for rehabilitation centre, Rubery Hill and Hollymoor Hospitals.

Bishop Auckland. Wright and Kellett Ltd., Ashley Terr, Chester-le-Street, awarded contract for £41,000 X-ray dept., Bishop Auckland General Hospital.

Brighton. Morgan and Carn, Grand Ave, Hove, architects for proposed Jaycee Furniture Ltd. factory, North Waddingdean. J. Lyons, Cadby Hall, W.1, propose new style restaurant and shops on £140,000 site, North St.

Bristol. Beaverbrook Newspapers Ltd., Fleet St, E.C.4, propose land development, Dale St area.

Burnley. Planned: extensions to Tullis Mills, Culshaw St, for Sheerloom Carpets Ltd. Workshop and stores, Rake Head Eng. Wks for Jas. South. Joseph Lucas Ltd., Burnley and Birmingham, propose factory, Eastern Ave industrial estate.

Cambridge. University authorities propose £100,000 Lady Mitchell lecture hall, Sedgwick Rd. Architects: Sir Hugh Casson and Neville Conder and Ptnrs., Thurlow Pl, S.W.7.

Carlisle. Proposed: for J. W. Richardson, motel, six-acre site, former aerodrome. Solicitors: Jackson and Saul, Fisher St.

Castle Ward. Planned by Greensitt Bros., builders, Nixon St, Newcastle, three-storey shopping centre/showrooms, etc., Darras Hill estate.

Cheadle Hulme. J. Gerrard and Sons Ltd., Swinton, Manchester, contractors for £106,000 warehouse/office block, for John Williams and Sons Ltd.

Chelmsford. B. W. Dawe and Co. Ltd., Mark La, E.C.3, propose marine engine factory, Widford industrial estate. Cundell Eve Co. Ltd., Old Ford Wks, Smeed Rd, E.3, propose box factory, same site. Planned: extensions to instrument dept. at Arc Wks, Writtle Rd, for Crompton Parkinson (Chelmsford) Ltd.

Chesterfield T.C. Tender: Civil Defence H.Q., Rose Hill, New Sq. Surveyor. New steel foundry, Pottery La, proposed by Alloy Steel and Iron Co. Ltd., Carbrook St Foundry, Sheffield 9.

Chester-le-Street. Cawthorn and Sinclair Ltd. propose filling station/offices, Birtley. Architects: Fannell and Baddiley, Bridge End Chmbrs.

Coventry C.C. Tender: first stage Walsgrave Primary School. Architect.

Crawley U.D.C. Tender: Council offices/suite, The Boulevard. Clerk.

Croydon. F. Watson (Croydon) Ltd., Thornton Rd, propose factory. Architect: E. R. Scratchley, High St, Thornton Heath.

Cumbernauld D.C. Tender: 433 dwellings, Carbrain. Chief Architect, Cumbernauld Hse, Cumbernauld, Glasgow.

Darlington. Maypole Dairy Co. propose supermarket, Skinnergate. J. W. Richardson and Co. Ltd., Quebec St, builders for L. and N. Stores Ltd. supermarket, Cockerton.

Dartford. Dartford Paper Mills Ltd. propose extensions, Lawson Rd, and 20 houses, Mill Hse, Priory Rd.

Drogheda. Tender: new factory. Brownlow, Kennedy and Morrison (Dublin) Ltd., Blessington St, Dublin.

Dunbarton. Hospital Board of Management propose 80-bed maternity unit, Alexandria, next to Vale of Leven Hospital. Architect: J. L. Gleave, Woodside Pl, Glasgow C.3.

Eastcote. Office block costing £80,000 planned for Concord Holdings Ltd. Contractors: Wm. Moss and Sons Ltd., North Circular Rd, N.W.2.

Eccles. Portland Mill extensions proposed by Wm. Fryer and Sons Ltd.

Essex. N.E. Metropolitan Hospital Board, Eastbourne Terr, W.2, propose extensions at Orsett Hospital to include seven-storey ward unit, maternity clinics, nurses' hostel.

Eston U.D.C. Planned: 60 flats. Surveyor, Normanby Rd, South Bank-on-Tees.

Gateshead. T.C. propose £200,000 multi-storey flats, Bensham/Rectory Rd site. Engineer.

Glasgow. Proposed: 529 multi-storey flats, Sighthill area. Architect: G. Bowie, Crudens Ltd., Musselburgh.

Godmanchester T.C. Proposed: bus station and facilities, Lawrence Ct Gdns. Surveyor.

Gosforth. U.D.C. proposes new depot, South Gosforth. Surveyor.

Guildford. Neave Eng. Co. Ltd., Poyle Rd, Tongham, propose factory extensions. Four-storey block of showrooms and offices at Stoke Old Rectory site for R. O. Blott. Architects: Malcolm Teck, S. L. Roberts and Associates, Friary St.

Hanley. Lewis Ltd., Liverpool 1, propose £1½ million offices/store, Town Centre.

Harlow. London Co-op. Soc., E.15, propose £200,000 store, Town Centre.

Harrietsham. John Laing and Sons Ltd., Mill Hill, N.W.7, to erect Marley Tile Co. Ltd. factory extensions, Dickley La, Lenham.

Havant. £1,277,000 contract for Vinyl Products Ltd., Butter Hill, Carshalton, 35-acre factory placed with Tersons Ltd., Dollis Park, N.3.

Hednesford. Fafnir Bearing Co. Ltd. award contract for 20-acre factory to Shepley Booth Associates Ltd., Wolverhampton.

Hemel Hempstead. Kodak Ltd., Mayland Ave, propose canteen/stores block. Staff architect: W. J. Turner.

Hove. Planned: 9½-acre development, 91 houses and villas and 19 flats, Dyke Rd area. Architects: H. Fitzroy Robinson and Ptnrs., Norfolk Sq, Brighton.

Ilford. £150,000 shops/offices proposed by Industrial and Investment Services. Contractors: A. Roberts and Co. Ltd., Eccleston Sq, S.W.1.

Keynsham. C. Bryant and Sons Ltd., Whitemore Rd, Birmingham, contractors for J. S. Fry and Sons Ltd. proposed £130,000 assembly block.

Kinfauns. D. B. Marshall (Newbridge) Ltd., Newbridge, Midlothian, propose £150,000 poultry packing station.

Larbert. Allied Ironfounders Ltd. (Northern Group), Falkirk, propose £500,000 foundry.

Leeds. University proposes £60,000 extensions to Woodsley Hall residential hostel, Clarendon Rd. Architect: P. H. G. Chamberlain, Sydney Mews, Fulham Rd, S.W.3.

Leics C.C. Proposed £20,000 extensions to Rothley C.E. School; first instalment of new Shepshed County Infants' School to cost £20.000. County architect, C.C. propose civic theatre to plans by Chamberlin Powell and Son, Sidney Mews, Chelsea, S.W.3.

London. Hepel Ltd. propose rebuilding of premises, Fairfield Rd, E 3: architect: R. P. King, Riviera Dr, Southend. University Coachwork Ltd., Boston Rd, W.7, propose new premises: architect: D. Armstrong Smith, 37a Wallbrook, E.C.4. Shops/offices, etc., proposed Arthur St area by City Parochial Foundation. Temple Gdns. E.C.4. St. Martin's le Grand Property Co. propose rebuilding Winchester Hse. Gt. Winchester St, E.C.2, for multi-storey blocks of offices. H. Fitzroy Robinson and Ptnrs., Gray's Inn Sq, W.C.1, architects for proposed 33-storey offices, Esso site, Albert Embankment. Atlas Securities Ltd., Park La, W.1, propose eight-floor commercial building, Lower Sloane St, S.W.1. Campbell-Jones and Sons, Dowgate Hill, E.C.4, architects for proposed ten-storey offices, King's Rd, S.W.3. Tender: 102 dwellings in four seven-storey blocks, Acacia R[4], Commerce Rd. Engineer, Wood Green.

Loughborough. Hospital Committee award £30,000 contract for new nurses' home, General Hospital, Mayfield Dr, to Wm. Moss and Sons Ltd.

Lytham St. Annes. Fylde Footwear Co. Ltd., Durham Ave, propose £100,000 factory on St. David's Rd North industrial estate.

Manchester. Central and District Properties, Berkley Sq, W.1, propose £1 million development to include nine-storey offices and shops, Market Pl area.

Middlesbrough. D. Crouch Ltd., Station Rd, Birtley, awarded £152,000 contract for St. Michael's R.C. Secondary School.

Newark. A. Monk and Co. Ltd., Padgate, Warrington, to erect packaging plant/welfare block, Kelham, for British Sugar Corpn.

North Riding C.C. Gollins, Melvin, Ward and Ptnrs., Manchester Sq, W.1, architects for Geo. Pindar County Modern School extensions.

Oxford. Proposed rebuilding of St. Anne's College at cost of £500,000. Architects: Howell, Killick and Partridge, Fitzroy Sq, W.1.

Portsmouth. Proposed: bowling alley with 24 lanes, Savoy Bldg, Southsea, for Savoy Ballroom Ltd.

Reading. Proposed: six-storey showrooms/shops/offices, Palace Theatre site. Architects: Chaplin and Burgoine, Cathedral Close.

Rochester. Blaw Knox Ltd., Medway Wks, propose factory extensions.

Saxilby. Phosphoric plant proposed by Kesteven Chemical Manure Co. Ltd.

Sheffield. United Sheffield Hospitals propose children's hospital out-patients' dept. to cost £150,000 and other works, costing £30,000.

South Wales. Dare-Inglis Products Ltd., Dinas Isaf, Williamstown, Tonypandy, propose factory, Dinas Isaf, Rhondda.

Stanley. U.D.C. propose bus station, town centre. Surveyor.

Stanmore. John Laing Ltd., Mill Hill, N.W.7, contractors for Aerofoam Ltd. factory/offices.

Sunderland. G. T. Brown, Grange Terr, Stockton Rd, architects for proposed offices, Thornhill Pk, for Durham Divisional Coal Board.

Surbiton. Planned: partial factory redevelopment for Crystal Products, Hook Rise South. Rebuilding part of Sayers Potteries, Leatherhead Rd.

Sutton-in-Ashfield. Booth Ledeboer and Pinkheard, Blackhall Rd, Oxford, architects for Metal Box Co. extensions, single-storey factory/offices/stores. Contractors: McAlpine and Sons Ltd.

Teddington. Tender: basic physics building for National Physics Laboratory. Min. of Works architect dept., Abel Hse, John Islip St, S.W.1.

Wakefield. Planned: Thornes La Wharf factory for Wakefield Shirt Co. Architects: Gillinson and Barnett, Queens Sq, Leeds 2.

Wanstead and Woodford B.C. Tender: 122 dwellings, Eastern Ave housing site. Architects: Tooley and Foster, Midland Bank Chmbrs, Buckhurst Hill, Essex.

Warlingham. Proposed: block of shops/offices, The Green. Architects: Wright and Swan, Upper Court Rd, Woldingham.

Washington. Washington Chemical Co. propose large factory extensions.

Waterford. Tender: 33 houses, St. John's Park. Clerk.

Watford. Pilot scheme for factories, Holywell industrial estate. Wakelin and Horne, St. Albans Rd.

MEETINGS TO NOTE

THURSDAY, 27 APRIL

I.E.E. The Fifty-second Kelvin Lecture: "Medical Electronics," Professor R. F. Woolmer. Savoy Pl, W.C.2. 5.30 p.m.

INSTITUTION OF MECHANICAL ENGINEERS (Steam Plant Group). Discussion: "Acid Cleaning as Applied to Steam Power Plant." 1 Birdcage Walk, S.W.1. 6 p.m.

FRIDAY, 28 APRIL

I.E.E. (S. Midlands Education Circle). Discussion: "The Selection of Engineering Students." College of Advanced Technology, Birmingham. 6 p.m.

I.E.E. (N.E. Graduates and Students). A.G.M. Grey Hall, King's College, Newcastle upon Tyne. 6.30 p.m.

I.E.E. (N. Midlands Graduates and Students). A.G.M. Gt. Northern Hotel, Wellington St, Leeds 1. 7 p.m.

SATURDAY, 29 APRIL

ASSOCIATION OF ELECTRICAL MACHINERY TRADES. Annual Convention at Queen's Hotel, Eastbourne, until 2 May.

MONDAY, 1 MAY

I.E.E. (Electronics and Communications Section). "Progress Report on the Development of a Photo-Electric Beam Index Colour Television Tube and System," R. Graham, J. W. H. Justice and J. K. Oxenham. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (E. Anglian). A.G.M. and "Generator/Motor Problems in Pumped-Storage Installations," J. H. Walker. Assembly Hse, Norwich. 7.30 p.m.

I.E.E. (S. Midlands). "Silicon Power Rectifiers," A. J. Blundell, A. E. Garside, R. G. Hibbert and I. Williams. James Watt Memorial Institute, Birmingham. 6.30 p.m.

ELECTRICAL ASSOCIATION FOR WOMEN. Annual conference Branch Officers' session at F.B.I. Tothill St, followed by an evening reception at the Goldsmiths' Hall.

A.S.E.E. (Bolton). "Refrigeration." Railway Hotel, Trinity St. 7.45 p.m.

A.S.E.E. (Essex). "Electricity in the 'Ohm'," Miss O. M. Price. Angel Hotel, Ilford Broadway. 8.15 p.m.

A.S.E.E. (Sheffield). "Historical Water Power in the Don Valley," G. F. Jones. Royal Victoria Hotel. 7.30 p.m.

TUESDAY, 2 MAY

I.E.E. (Measurement and Electronics Section). "Structural Properties and Applications of Evaporated Metal Films," D. W. Pashley and "Deposition of Evaporated Non-Magnetic Films," J. R. Balmer. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (Southern). "The Potentialities of Artificial Earth Satellites for Radiocommunication," W. J. Bray. Farnborough Technical College. 6.15 p.m.

I.E.E. (N. Ireland). A.G.M. Civil Engineering Dept., David Keir Building, Queen's University, Stranmillis Rd, Belfast 9. 6.30 p.m.

I.E.E. (North Midlands Centre). A.G.M. Leeds and County Conservative Club, South Parade, Leeds. 6.30 p.m.

ELECTRICAL ASSOCIATION FOR WOMEN. A.G.M. at Kingsway Hall, W.C.2, followed by annual luncheon at the Connaught Rooms, Caroline Haslett Memorial Lecture at I.E.E., Savoy Pl, W.C.2. 6 p.m.

WEDNESDAY, 3 MAY

I.E.E. Railway Modernisation Conference (Joint Conference with Civils and Mechanicals). Gt. George St, S.W.1, and 4 May.

I.E.E. (N. Lancs). A.G.M. and "Electronic Aids to Banking and Commerce," R. Feinberg. N.W.E.B. Demonstration Theatre, Friargate, Preston. 7.30 p.m.

I.E.E. (Tees-Side). "An Analytical Approach to Industrial Lighting," W. Imrie-Smith. Cleveland Scientific and Technical Institution, Middlesbrough. 6.30 p.m.

I.E.E. (Sheffield Graduate and Students). A.G.M. and Senior Chairman's address. Grand Hotel, Sheffield.

BRITISH INSTITUTION OF RADIO ENGINEERS (Computer and Radar Groups). Symposium: "Computer Control of Air Traffic." London School of Hygiene and Tropical Medicine, Keppel St, Gower St, W.C.1. 3 p.m.

IRON AND STEEL INSTITUTE. A.G.M. and technical sessions (one on oxygen steelmaking and three on computers). Institution of Mechanical Engineers, Birdcage Walk; and in conjunction with Institute of Metals a symposium: "Structural Processes in Creep" at Hoare Memorial Hall, Church Hse, Gt. Smith St, S.W.1, until 4 May.

A.S.E.E. (Halifax). "Solderless Connectors," A. S. Ferguson. The Crown Hotel, Horton St. 7.45 p.m.

A.S.E.E. (Manchester). "Marine Electrical Auxiliaries," J. H. B. Raw. The Engineers' Club, Albert Sq. 7.15 p.m.

A.S.E.E. (Preston). "Resins in Industry for Electrical Components," H. Davies. R.A.F.A. Club, East View. 7.30 p.m.

A.S.E.E. (S.E. London). "Cables and Their Uses," A. Richardson. Eltham Green School, Queenscroft Rd. 7.45 p.m.

THURSDAY, 4 MAY

A.S.E.E. (Brighton, Hove and District). "Production of a Technical Journal," R. Baldwin (Editor, ELECTRICAL TIMES). New Imperial Hotel, First Ave, Hove. 7.30 p.m.

FRIDAY, 5 MAY

I.E.E. (Medical Electronics Group). Discussion: "Artificial Muscles." Savoy Pl, W.C.2. 6 p.m.

I.E.S. (Edinburgh) Joint meeting with Glasgow and Newcastle Centres at Peebles until 7 May.

A.S.E.E. (Liverpool and District). "Particle Accelerators," B. S. Halliday. Industrial Development Centre, M.A.N.W.E.B., Paradise St. 7.30 p.m.

A.S.E.E. (Stoke and Crewe). "Plastics in the Electrical Industry," A. J. J. Moulam. Grand Hotel, Hanley. 7.30 p.m.

MONDAY, 8 MAY

I.E.E. (Electronics and Communications Sections). "The Corona-Discharge and its Application to Voltage Stabilisation," E. Cohen and R. O. Jenkins; "Impedance Frequency Characteristics of Glow-Discharge Reference Tubes," F. A. Benson and P. M. Chalmers; and "Comparison of Argon, Krypton and Xenon as Admixtures in Neon Glow-Discharge Reference Tubes," F. A. Benson and G. P. Burdett. Savoy Pl, W.C.2. 5.30 p.m.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Planet Electrical Ltd. Creditors to send details to liquidator, T. E. Tildesley, 27 Broad Oaks Rd, Solihull, by 31 May. Formal notice: all creditors to be paid in full.

Landmar Electrical Engineering Ltd. Creditors to send details to liquidator S. Price, Albion Hse, King St, Gloucester, by 31 May. Formal notice: all creditors to be paid in full.

Sayers and Williams Ltd. Mr R. A. Hawken, Bank Chmbrs, 1 John St, Bedford Row, W.C.1, appointed liquidator at extraordinary general meeting on 11 April for the purpose of voluntarily winding-up.

Home and Domestic Services (Bristol) Ltd. Mr G. C. Ehlers, 28 Baldwin St, Bristol 1, appointed liquidator at extraordinary general meeting on 29 March for the purpose of voluntarily winding-up.

Overseas Electrical Supplies Ltd. Sir Harold Moore, Jacey Hse, Bournemouth, appointed liquidator at extraordinary general meeting on 10 April for the purpose of voluntarily winding-up.

Billingham (Electrical) Ltd. Creditors to send details to liquidator, W. L. Hand, Colmore Hse, 21 Waterloo St, Birmingham 2, by 29 April.

Pool Electrics (Blackpool) Ltd. Creditors to send details to liquidator: J. L. Hague, Bank Chmbrs, 7 South King St, Blackpool, by 29 April.

Barbados Electric Supply Corpn. Ltd. General meeting to be held at 3 London Wall Bldgs, E.C.2, on 19 May, at 12 noon, for the purpose of having an account of the winding-up laid before members.

Plow Water Heaters Ltd. Petition for winding-up to be heard before the County Court of Cardiff on 3 May. Persons intending to appear to notify Rapport and Russell, 18 Dumfries Pl, Cardiff, by 4 p.m., 2 May.

Longford Electric Co. Ltd. First meetings of members and contributories to be held at Room 401, Inveresk Hse, 346 Strand, W.C.2, on 2 May, at 2.30 and 3 p.m., respectively.

BANKRUPTCY ORDERS

Receiving Orders

Derby. G. C. Ross, electrical retailer, carrying on business as Midland Electrical Supplies at 80 Green La. Receiving order dated 10 April.

Sheffield. P. M. Whitehead, furniture and electrical goods dealer, carrying on business at 100 Staniforth Rd and formerly at 4 Lemont Rd, Totley. Receiving order dated 7 April.

Public Examination

Sheffield. P. M. Whitehead, furniture and electrical goods dealer, carrying on business at 100 Staniforth Rd and formerly at 4 Lemont Rd, Totley. Public examination: 2 p.m., 22 June, at County Court Hall, Bank St, Sheffield 1.

Intended Dividend

Ipswich. J. S. R. Morley, plumber and electrical engineer, carrying on business at Grove Cottage, Botesdale, near Diss, and formerly as Morley and Bishop at The Street, Redgrave, near Diss. Last day for receiving proofs for intended dividend: 28 April, to trustee: C. A. Taylor, 3-5 Northgate St, Ipswich.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Aluminium Heating and Lighting Co. Ltd., Kilton Wks, Skinninggrove, Saltburn-by-the-Sea. To take over business carried on as "The Aluminium Heating and Lighting Company" at 6 Maple Grove, Brotton, Yorks, etc. Nom. cap.: £2,000. Dirs.: Frederick Peel and Anthony Stewart.

Bonus Clocks Ltd., 5 and 7 Church Rd, Richmond, Surrey. Manufacturers of and dealers in electrical and mechanical devices and components for time and motion study systems, etc. Nom. cap.: £100. Dirs.: John A. M. Taylor, Donald B. H. Robinson and Ronald C. Skelton.

A. Wille and Co. Ltd., rear of No. 1 Sutton Court Rd, Sutton, Surrey. Electrical contractors and engineers, etc. Nom. cap.: £100. Dirs.: Leslie C. Stevenson and Mrs Anna M. Stevenson.

Laws and Williams Ltd., Dartmeet, Birtley Rd, Bramley, Guildford. To carry on business of electricians, etc. Nom. cap.: £100. Permanent dirs.: Michael J. Laws and Christopher J. Williams.

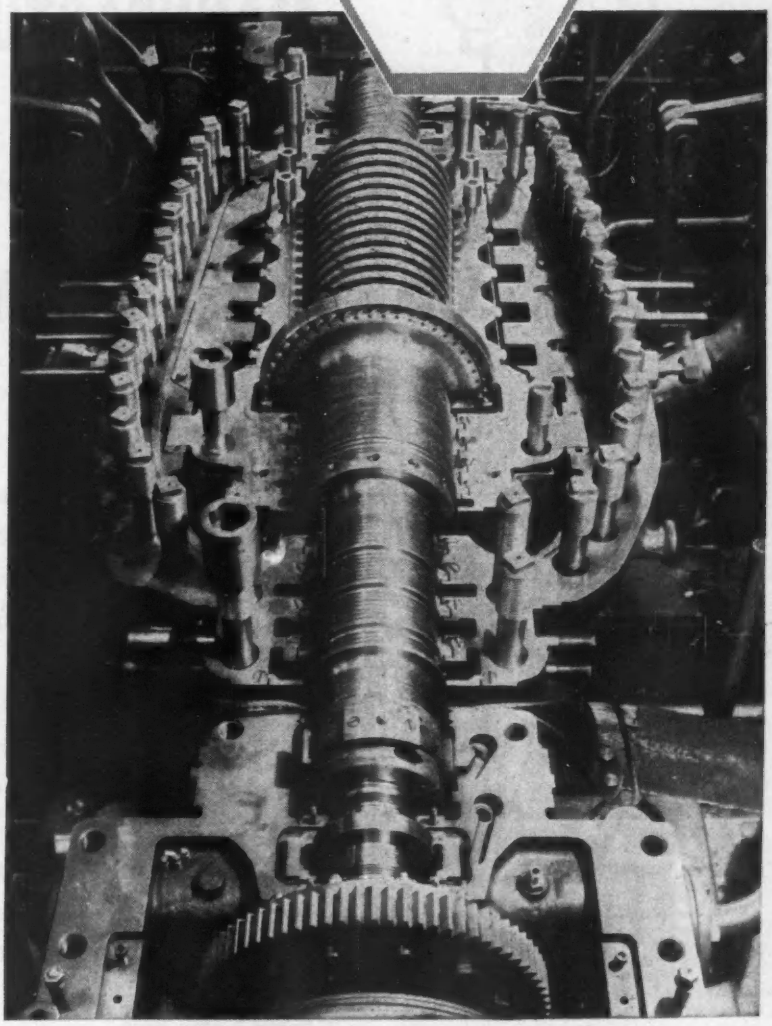
T. J. and T. Lee Ltd., 13 Well Court, Bow La, E.C.4. Manufacturers of and dealers in radio, electrical and mechanical apparatus, etc. Nom. cap.: £1,000. Dirs.: Terence J. Lee, Teresa Lee and Maeve P. Gray.

R. Black (Hollinwood) Ltd., 50 Broom La, Salford 7. Retailers of tools, electrical accessories, etc. Nom. cap.: £2,000. Dirs.: Raphael Black and Rachel Black.

Waso Ltd. Importers, exporters, manufacturers of and dealers in electrical goods, etc. Nom. cap.: £3,000. Dirs.: to be appointed by subs. Subs.: Oscar A. E. Wallmark, Kungsparlaveny 23, Gothenburg, Sweden; and Ola G. Alen.

POWER W G

The rotor of the highest pressure turbine built in Britain . . .



. . . part of a complete generating plant recently manufactured in our Hartlepool Works, to Brown-Boveri design, and now in service at the Margam "B" power-station of the Steel Company of Wales. The turbine is designed to take steam at 3000 p.s.i. at 1050°F and exhaust at 650 p.s.i. The turbine speed of 9,500 r.p.m. is geared down to 3000 r.p.m. for the alternator, which generates 9,250 Kw at 11,500 volts, 0.7 p.f.

In addition to steam and gas turbo-alternators, we manufacture at Hartlepool most items of power plant equipment, including water-tube boilers, Economic boilers, condensers, feed heaters and 'Deptford' rotary water strainers. We accept entire responsibility for the manufacture, installation and commissioning of complete industrial power plants.

We are exhibiting on Stand 7, Row G, Ground Floor, at the Engineering, Marine, Welding & Nuclear Energy Exhibition, Olympia, April 20th to May 4th, 1961.

RICHARDSONS WESTGARTH (HARTLEPOOL) LTD.

A member of the RICHARDSONS WESTGARTH GROUP
HARTLEPOOL, CO. DURHAM and at 58 VICTORIA STREET, LONDON, S.W.1.
59 MOSLEY STREET, MANCHESTER, 75 BUCHANAN STREET, GLASGOW. RW 82

FOR THE MANUFACTURER WHO DOESN'T KNOW...

- Large differential to avoid rapid cycling — approximately 18°F (10°C.)
- Nominal temperature range 100°F (55°C.)
- Standard unit set to switch off at top point of scale — approximately 150°F (65°C.)

. . . that the Sunvic TA. 1 Thermostat is the most reliable and adaptable unit of its kind. Already used by most convector manufacturers today, the TA. 1 Thermostat is also ideal for fan heaters, heating cabinets, and similar equipment. It operates on the self-heat principle, and has a wide bimetal fully exposed to the air stream. The snap-action micro-switch—rated at 15 a. 250V A.C.—has large silver contacts to ensure low contact resistance and long life. *Write for Publication 3012.*

AEI

Instrumentation Division
P.O. Box 1 · Harlow · Essex · Harlow 25271
Associated Electrical Industries Limited

SC/103

CLASSIFIED ADVERTISEMENTS

TENDERS INVITED

BOROUGH OF CHELTENHAM
Street Lighting 1961-62

TENDERS are invited for the supply and erection of Group "B" lighting installations in various streets of the Borough as follows:

Bill No. 1. For the supply only of 64 No. 60 watt sodium lanterns and 42 No. 45 watt sodium lanterns complete with all ancillary gear.

Bill No. 2. For the supply and erection of 106 fluted steel columns together with the fitting and wiring of lighting equipment.

Specification and Bills of Quantities can be obtained from the undersigned on payment of a deposit of £3 3s, which will be refunded on receipt of a bona fide tender not subsequently withdrawn, and the return of all documents.

Tenders, together with fully priced Bills of Quantities are to be submitted in the envelope provided, to the Town Clerk, P.O. Box No. 12, Municipal Offices, Cheltenham, not later than noon on Wednesday, 24 May, 1961.

The Council does not bind itself to accept the lowest or any tender.

W. E. C. BIRD,
A.M.I.C.E., M.I.MUN.E., A.M.I.W.E.,
Borough Surveyor.

Municipal Offices,
Cheltenham. (A 470)

BOROUGH OF MORECAMBE AND HEYSHAM
Electrical Installation—85 Market Stalls
Poulton Hall Markets

TENDERS are invited for the electrical installation to the above-mentioned works.

Specification and Form of Tender may be obtained from and plans inspected at the office of the Borough Engineer and Surveyor upon payment of a deposit of £1, which will be returned upon receipt of a bona fide tender not subsequently withdrawn.

Tenders, endorsed "Electrical Installation —Markets, Poulton Hall," must reach me by 9 a.m., Monday, 8 May, 1961.

The lowest or any tender will not necessarily be accepted.

C. E. BOTTOMLEY,
Town Clerk.
(A 486)

APPOINTMENTS VACANT

CENTRAL ELECTRICITY GENERATING BOARD
Midlands Project Group
GENERAL ASSISTANT ENGINEERS
(DRAWING OFFICE)—CIVIL

APPLICATIONS are invited for appointments as General Assistant Engineers (Drawing Office) (Civil), in the Midlands Project Group's Drawing Office, at Bourneville, Birmingham.

Candidates should possess a sound practical and technical training and should preferably be fully qualified. The salary will be within the range £650/£1,090 per annum, in accordance with the National Joint Board Agreement.

Applications should be made on standard form AE6, available from the Administrative Officer, Midlands Project Group, P.O. Box 314, Birmingham 30, and should be returned to him not later than 8 May, 1961.

Envelopes should be marked "Confidential," quoting Staff Vacancy No. MPG.27/61. (A 430)

THE SCHOOL OF ENGINEERING
KUMASI COLLEGE OF TECHNOLOGY, GHANA

APPLICATIONS are invited for the following posts:

Civil Engineering Department

LECTURERS IN (a) MECHANICS OF FLUIDS
(b) THEORY OF STRUCTURES
(c) LAND SURVEYING.

Mechanical Engineering Department

SENIOR LECTURER IN STRENGTH OF MATERIALS (NOT METALLURGY)
LECTURER GRADE APPOINTMENT AS WORKSHOP SUPERINTENDENT
LECTURER IN ENGINEERING DRAWING

Electrical Engineering Department

LECTURERS IN (a) POWER GENERATION AND DISTRIBUTION
(b) PRODUCTION AND TESTING OF ELECTRICAL MACHINES
(c) TELECOMMUNICATIONS

A degree in Engineering is necessary for all posts, and post-graduate or teaching experience is essential. The Engineering School is recognised by London University for the B.Sc. (Engineering) Degree. Ample facilities for research are available. The Ghana Government intends to establish the Kumasi College of Technology as an autonomous University in the very near future.

Appointments are normally for five years and may be renewed; three months' notice of resignation of an appointment is required on either side.

Contract Salary Scales are:

Senior Lecturer: £2,370 x £90—£2,910 per annum.

Lecturer: £1,387 10s x £75—£2,437 10s per annum.

Lecturer (Land Surveying): £1,295 x £70—£2,275 per annum.

In addition, children's allowances are paid up to a maximum of three, and a gratuity at the end of the contract at the rate of £150 for each year of satisfactory service. The entry point is fixed according to qualifications and experience.

Application forms and an information brochure may be obtained from the Assistant Registrar, Kumasi College of Technology, 29 Tavistock Sq, London W.C.1, who will be glad to answer any questions about these appointments. (A 491)

LONDON ELECTRICITY BOARD
GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the above position. Initially the successful candidate will be located at 44 Powis St, Woolwich, S.E.18.

Applicants should have a sound technical education to the standard of the Higher National Certificate, and have completed a recognised period of training in the Electricity Industry, or have equivalent experience.

The post is graded under Schedule B of the National Joint Board Agreement as Class BX, Grade 15, £695 per annum, rising to £920 per annum, inclusive of London Allowance.

Applications stating age, qualifications and experience, should be sent direct to the Manager, South Eastern District, at the above address within 14 days of the publication date of this notice. Please quote Ref.: PER/V/3219/T. (A 489)

CENTRAL ELECTRICITY GENERATING BOARD
North Eastern and Yorkshire Region
REGIONAL ELECTRICAL ENGINEER'S DEPARTMENT

APPLICATIONS are invited for appointments in the Transmission Project Branch of the Regional Electrical Department, based on Leeds.

(1) THIRD ASSISTANT ENGINEERS
(CIVIL—SPECIFICATIONS AND CONTRACTS)

Salary: Grade 7 BX (£1,200/£1,500 per annum).

Applicants should have had previous experience in contract procedure for major civil engineering and building works. Duties will include the preparation of estimates of costs, preparation of contract documents with a special reference to specifications and bills of quantities, examination and perusal of tenders. Should also be able to conduct contract measurement on site.

Candidates will work in a team responsible for the engineering of civil and building works for major transmission substations in the Region and experience on constructional and electrical projects would be an advantage.

(2) THIRD ASSISTANT ENGINEERS
(CIVIL—SITE)

Salary: Grade 8 BX (£1,105/£1,410 per annum).

Applicants should have had experience in the supervision of construction of major civil engineering works comprising reinforced concrete structures and buildings employing modern methods of quality control. Experience on power station or substation civil engineering project is desirable.

(3) THIRD ASSISTANT ENGINEER
(DRAWING OFFICE SECTION LEADER—ELECTRICAL)

Salary: Grade 8 BX (£1,105/£1,410 per annum).

To be responsible to the Engineer in Charge, Drawing Office, for the organisation and supervision of the Electrical Engineering Section. Applicants should have had experience in all aspects of drawing office work connected with electrical contracts at main transmission substations comprising schematic, wiring and phasing diagrams, electrical layout, section and auxiliary plant building layout drawings.

(4) THIRD ASSISTANT ENGINEER
(DRAWING OFFICE SECTION LEADER—CIVIL AND MECHANICAL)

Salary: Grade 8 BX (£1,105/£1,410 per annum).

To be responsible to the Engineer in Charge, Drawing Office, for the organisation and supervision of the Civil and Mechanical Engineering Section. Applicants should have experience in all aspects connected with major civil engineering contracts at main transmission substations comprising reinforced concrete structures and associated buildings. A knowledge of reinforced concrete and structural design would be an advantage.

(5) FOURTH ASSISTANT ENGINEERS
(CLERK OF WORKS—CIVIL)

Salary: Grade 11 BX (£855/£1,165 per anuum).

Applicants should have had experience in the supervision of the construction of major civil engineering works comprising reinforced concrete structures and buildings employing modern methods of quality control. Experience on power station or substation civil engineering works would be an advantage. Knowledge in the use of surveying instruments for setting out checking of foundation levels and alignment of structures is essential.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 19 May, 1961. (A 471)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 46s. per inch, and all other classified advertisements at 3s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

YORKSHIRE ELECTRICITY BOARD

Head Office

CHIEF ENGINEER'S DEPARTMENT
DISTRIBUTION DESIGN (SUBSTATIONS)
SECOND ASSISTANT ENGINEER

DUTIES will include the design of indoor and outdoor substations operating at voltages of 33 kV and above, the preparation of specifications for substation plant and subsequent negotiations with plant manufacturers. They will also cover protective gear applications on the primary h.v. system.

Applications are invited from suitably qualified engineers having a sound general knowledge of substation plant and some experience of field construction.

Salary: N.J.B., Class BX, Grade 5 (transitional to Scale 14), £1,375/1,720 p.a.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, nr. Leeds, not later than 12 May, 1961.

No. 1 (Bradford) Sub-Area

KEIGHLEY DISTRICT
DISTRICT COMMERCIAL ENGINEER

Applicants should have had considerable experience in all aspects of a District Commercial Organisation. Candidates must have a sound knowledge of tariffs and their appropriate application, and be capable of carrying out negotiations with all classes of consumers for new and additional loads. They should have experience of load development, be fully conversant with I.E.E. Wiring Rules and with Statutory Regulations, and be capable of controlling staff. The possession of a Higher National Certificate in Electrical Engineering or its equivalent would be an advantage.

Salary: N.J.B. Class F, Grade 3 (Scale 12), £1,350 x £30—£1,500 p.a.

THIRD ASSISTANT DISTRICT ENGINEER

Applicants should have passed the Associate Membership Examination of the Institution of Electrical Engineers, or hold equivalent qualifications, and have experience in construction, operation and maintenance of high voltage systems, underground cables and overhead lines and substations, and medium low voltage networks.

Candidates should be prepared to reside within the District and undertake standby duties.

This post has been advertised before and previous applicants need only state by letter if they wish their application to be reconsidered.

Salary: N.J.B. Class F, Grade 9 (Scale 6), £890/£1,015 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford 1, not later than 12 May, 1961.

No. 4 (Leeds) Sub-Area

CONSUMERS' ENGINEER (LEEDS)

Applicants should have had a sound practical training in the Electricity Supply Industry and should possess a Higher National Certificate in Electrical Engineering or an equivalent qualification. Candidates should be capable of carrying out negotiations with all types of consumers for new and additional supplies and have a sound knowledge of the various tariffs. They should have had experience of general load development, be fully conversant with the Electricity Supply and I.E.E. Regulations and be capable of controlling staff.

Salary: N.J.B. Class K, Grade 7 (Scale 12), £1,350/£1,500 p.a.

ASSISTANT CONSUMERS' ENGINEER (LEEDS)

Applicants should have had a sound practical training in the Electricity Supply Industry and should possess a Higher National Certificate in Electrical Engineering or an equivalent qualification. They should have had experience in general load development in the industrial, commercial and domestic fields, be fully conversant with Electricity Supply and I.E.E. Regulations and be capable of undertaking all forms of consumer service.

Salary: N.J.B. Class K, Grade 10 (Scale

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9), £1,115/£1,245 p.a.

Applications, together with the names of two referees, should be sent to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, nr. Leeds, not later than 12 May, 1961. (A 481)

ARABIAN GULF SHEIKDOM OF QATAR

State Electricity Department, Doha

APPLICATIONS are invited for the following posts on three- to five-year contracts in a new steam power station, the initial equipment of which is two 15,000 kW turbo-alternator sets with associated gas-fired boilers and ancillary equipments.

ASSISTANT POWER STATION SUPERINTENDENT (Scale E.1)

Qualifications: First class M.O.T. Certificate (Steam and Motor) or Higher National Certificate (Mechanical and Electrical), plus at least six years' experience in modern power station operation and maintenance practice.

ELECTRICAL MAINTENANCE ENGINEER (Scale E.2)

Qualifications: Higher National Certificate (Electrical), plus at least six years' experience in power station plant maintenance, particularly rotating machinery, transformers, control and switchgear up to 66 kV and protecting gear.

MECHANICAL MAINTENANCE ENGINEER (Scale E.2)

Qualifications: First class M.O.T. Steam Certificate or equivalent with at least three years' maintenance experience with modern steam power station plant and ancillary equipment. Applicants must be prepared to carry out overhauls assisted by locally employed fitters and also to assist with maintenance of large diesel units.

SHIFT CHARGE ENGINEERS (Scale E.2)

Qualifications: Second class M.O.T. Certificate or National Certificate or equivalent with at least four years' experience in charge on shift duties in modern steam power stations and fully experienced in synchronising and switching operations **on H.T. up to 66 kV** and L.T. feeder networks.

Salaries: Scale E.1, £2,250/£2,280; Scale E.2, £1,590/£2,070. Starting point according to experience.

Age Limits: 30-45 years.

General Conditions: FREE air-conditioned accommodation furnished at high standard. FREE fuel, water and electricity. FREE air passages for applicant, wife and up to three children. FREE medical and dental attention. ANNUAL LEAVE of six days for each month of duty. INTEREST FREE car loan with generous running allowance. GRATUITY of one month's salary for each year of service. NO INCOME TAX.

Applications endorsed "Electricity Qatar" should be sent by AIRMAIL to Director of Personnel, Government of Qatar, Doha, Qatar, Arabian Gulf, with copy to Messrs Preece, Cardew and Rider, Consulting Engineers, 8-12 Queen Anne's Gate, London S.W.1, giving full details of qualifications, experience, nationality, age, religion, marital status, names of three referees and a recent dated photograph. (A 452)

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

APPLICATIONS are invited for the following superannuable N.J.B. appointments in the South Wales Division:

ASSISTANT SHIFT CHARGE ENGINEER
ROGERSTONE POWER STATION
RISCA ROAD, ROGERSTONE, MON
Vacancy No. 81/ET/61.

Salary: Schedule A, Class G, Grade 8, Scale 8, £1,040/£1,165 per annum.

Re-Advertisement
ASSISTANT SHIFT CHARGE ENGINEER
USKMOUTH "A" POWER STATION
WEST NASH, NR. NEWPORT, MON
Vacancy No. 82/ET/61.

Salary: Schedule A, Class K, Grade 8, Scale 11, £1,275/£1,410 per annum.

Previous applicants need not re-apply.

STATION SHIFT CONTROL ENGINEER
USKMOUTH "A" AND "B" POWER STATIONS
WEST NASH, NR. NEWPORT, MON
Vacancy No. 83/ET/61.

Salary: Schedule A, Class M, Grade 10, Scale 11, £1,275/£1,410 per annum.

For the above posts applicants should possess H.N.C. or equivalent qualifications and have had operating experience in a modern power station.

10% shift allowance applied in all cases.

FOURTH ASSISTANT ENGINEER (CIVIL)
DIVISIONAL TRANSMISSION DEPARTMENT
BASED AT NEATH, GLAM
Vacancy No. 84/ET/61.

Salary: Schedule B, Class AX, Grade 9, Scale 9, £1,005/£1,245 per annum.

Duties will include site survey and levelling for grid substations. The supervision of site construction work including concrete foundations (and piling where necessary), reinforced concrete structures and buildings, site measurements and certification for payment.

FOURTH ASSISTANT ENGINEER
(OVERHEAD TRANSMISSION LINES)
DIVISIONAL TRANSMISSION DEPARTMENT
BASED AT NEATH, GLAM
Vacancy No. 85/ET/61.

Salary: Schedule B, Class AX, Grade 9, Scale 9, £1,005/£1,245 per annum.

Duties include survey work associated with the construction of 132 kV and higher voltage transmission lines, supervision of construction of steel tower and wood pole overhead lines.

Applicants for the above posts should possess H.N.C. or equivalent qualifications and experience in this type of work is desirable.

Special application forms obtainable from Divisional Secretary, Central Electricity Generating Board, South Wales Division, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 13 May, 1961. (A 487)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

West Midlands Division

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)

REQUIRED at Rugeley Power Station, Rugeley, Staffs. N.J.B. service conditions, superannuable appointment. Salary according to Class L, Grade 8, Scale 12, £1,350/£1,500 per annum.

Applicants should have served an apprenticeship and possess technical qualifications of H.N.C. level or leading to corporate membership of a major engineering institution.

Wide practical experience of mechanical maintenance at a modern power station is essential.

Apply, quoting vacancy no. 122/61 MD, on form AE6, available from the Station Superintendent, Rugeley Power Station, Rugeley, Staffs, to whom they should be returned by 8 May, 1961. (A 483)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT (SECRETARIAL)
SURREY AREA HEADQUARTERS
DORKING

SALARY: £780/£880 p.a. under N.J.C. Grade 3 or £890/£1,010 p.a. under N.J.C. Grade 4, according to experience and qualifications. Superannuable. The appointment will afford an opportunity of gaining good all-round experience of the Board's organisation. Duties will include assisting in system reviews and similar assignments.

Applications quoting ET and naming two referees on forms from Surrey Secretary, Seeboard, Rough Rew, Ridgeway Rd, Dorking, by 10 May, 1961.

GENERAL ASSISTANT ENGINEER
SEVENOAKS AND REIGATE DISTRICT

Salary: £890/£1,015 per annum under N.J.B. Agreement Class G, Grade 10, according to qualifications, experience and ability. Superannuable. Applicants should be suitably qualified and have training and experience in the construction, operation and maintenance of underground and overhead distribution systems up to 11 kV. The successful candidate will operate from district office, Oxted, but duties will cover any point within the district.

Applications quoting ET and naming two referees to District Manager, Seeboard, Electric Hse, West Hill, Oxted, by 10 May, 1961.

JUNIOR ASSISTANT DISTRICT
COMMERCIAL ENGINEER
TUNBRIDGE WELLS DISTRICT

The duties of this post will be of a general nature, and preference will be given to applicants who are studying for or have completed the H.N.C. course. Salary: N.J.B. Class F, Grade 12, £715/£805 p.a.

Applications quoting ET and naming two referees to District Manager, Seeboard, Town Hall, Tunbridge Wells, by 10 May, 1961.

ASSISTANT DISTRICT ENGINEER
MAIDSTONE DISTRICT

Salary under N.J.B. Class F, Grade 9, £890 x £25—£1,015. Superannuable. Applicants should have had a good general education, be technically trained to H.N.C. Standard and have had practical experience in general distribution work on H.V. and L.V. systems. Knowledge of the preparation of system extension and reinforcement proposals an advantage.

Applications, quoting ET and naming two referees, to District Manager, Seeboard, Fairmeadow, Maidstone, by 10 May, 1961. Previous applicants for this appointment need not re-apply.

GEORGE WRAY,
Secretary.
(A 477)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

SUB-AREA COMMERCIAL DEPARTMENT
THIRD ASSISTANT ENGINEER
(COMMERCIAL)
82/61.R.

Candidates should have had a good general and technical education with experience in the design, installation and selling of thermal storage heating to builders, architects, etc., together with a knowledge of tariffs. Membership of the Institution of Electrical Engineers or possession of the Higher National Certificate would be an advantage.

Salary: N.J.B. Class L, Grade 9 (£1,275/£1,410 per annum).

Apply by letter to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend St, Bedford, by 12 May, 1961.

Essex Sub-Area

NORTH ESSEX DISTRICT
ENGINEER
92/61.R.

This vacancy arises from the impending retirement of the present District Engineer.

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Candidates should have had wide experience in the planning, construction, operation and maintenance of overhead and underground distribution sytems (including substations) and should be capable of organising and supervising the engineering work of the District.

Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary: N.J.B. Class F, Grade 3 (£1,350/£1,500).

Apply by letter to J. C. Horrell, M.I.E.E., Manager, North Essex District, Eastern Electricity Board, Cressing Rd, Braintree, Essex, by 12 May, 1961.

Northmet Sub-Area

ASSISTANT ENGINEERS

(a) THIRD ASSISTANT ENGINEER
STEVENAGE DISTRICT
(Ref. 1030) 84/61.R.

(b) FOURTH ASSISTANT ENGINEER
HENDON DISTRICT
(Ref. 1054) 87/61.N.

(c) FOURTH ASSISTANT ENGINEER
HERTFORD DISTRICT
(Ref. 942) 88/61.N.

(d) FOURTH ASSISTANT ENGINEER
STEVENAGE DISTRICT
(Ref. 1055) 89/61.N.

Candidates should have had sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems, including substations.

Salary: (a) N.J.B. Class G, Grade 9 (£965/£1,090); (b) N.J.B. Class G, Grade 11 (£825/£940) plus London Allowance; (c) and (d) N.J.B. Class G, Grade 11 (£825/£940).

Apply by letter, by 8 May, 1961 as follows:

For (a) and (d) to H. L. Sumner, Manager, Eastern Electricity Board, Walkern Rd, Stevenage.

For (b) to F. A. Moinet, M.I.E.E., Manager, Eastern Electricity Board, 137-139 Brent St, Hendon, N.W.4.

For (c) to W. H. Hatton-Ward, ASSOCIATE I.E.E., A.M.B.I.M., Manager, Eastern Electricity Board, Bridgefoot, Ware, Herts.

METER TESTING STATION
15 FRIERN BARNET LANE, N.11
GENERAL ASSISTANT ENGINEER
(Ref. 979) 90/61.N.

Candidates should have had a good general and technical education. A knowledge of the repair, testing and commissioning of meters and metering equipment for domestic and industrial supplies will be an advantage.

Salary. N.J.B. Class N, Grade 15 (£965/£1,090) plus London Allowance.

Apply by letter to the Manager, Eastern Electricity Board, Northmet Sub-Area, Northmet Hse, Southgate, London N.14, by 8 May, 1961.

EDMONTON DISTRICT
SENIOR SALES REPRESENTATIVE
(Ref. 1057) 93/61.N.

Candidates should have had practical training with experience of domestic and small commercial and industrial installations. An ability to sell appliances with advice to consumers on supply matters, tariffs and apparatus is required.

Salary: N.J.C. Grade 2 (£700/£775) plus London Allowance.

Apply by letter to C. A. Baker, B.SC.,ENG. (LOND), M.I.E.E., Manager, Eastern Electricity Board, Edmonton District, 305 Fore St, Edmonton, N.9, by 8 May, 1961.

Suffolk Sub-Area

STOWMARKET DISTRICT
THIRD ASSISTANT ENGINEER
83/61.N.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems, including substations, at voltages up to and including 33 kV.

Salary: N.J.B. Class F, Grade 9 (£890/£1,015).

Apply by letter to G. N. H. Mayes, T.D., A.M.I.E.E., Manager, Stowmarket District, Eastern Electricity Board, 25 Ipswich Rd, Stowmarket, Suffolk, by 12 May, 1961.
(A 488)

THE EAST MIDLANDS ELECTRICITY BOARD

Northamptonshire Sub-Area

Re-Advertised Vacancy No. 34/61.
THIRD ASSISTANT DISTRICT ENGINEER
NORTHAMPTON DISTRICT

SALARY: N.J.B. Class G, Grade 9, £965/£1,090 per annum.

The duties of the post will be to assist in the planning, construction, operation and maintenance of underground and overhead systems up to and including 11 kV.

The successful candidate will be required to reside in or near Northampton and to undertake standby duty.

Vacancy No. 46/61.
PRINCIPAL ASSISTANT (INCOME)
NORTHAMPTONSHIRE SUB-AREA
HEADQUARTERS

Salary: N.J.C. Grade 7, £1,250 x £35—£1,355 per annum.

The successful applicant will be responsible for the three Sections dealing with:

1. Pre-Billing and Prepayment.
2. Special Billing.
3. Post-Billing.

Candidates should possess a recognised accountancy qualification and have had experience in all matters relating to consumers' accounts.

Applications for the above vacancies, giving details of age, qualifications, experience, present position and salary, should be forwarded to the Manager, Northamptonshire Sub-Area, 25 Bridge St, Northampton, so as to reach him not later than Saturday, 13 May, 1961. (A 479)

SOUTHERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER
(PLANNING AND DEVELOPMENT)

SUB-AREA Engineering Department of No. 1 (Southall) Sub-Area, located at Waterloo Rd, Uxbridge. Salary: N.J.B. Class M, Grade 10 (£1,325/£1,460 per annum, inclusive of London Allowance). N.J.B. Conditions of Service.

The duties of the post will be to assist in the planning of H.V. and L.V. networks, including system load flow and short-circuit calculations.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill La, Southall, Middlesex, and returned to him, quoting Z.1339, not later than 8 May, 1961.

FIELD ENGINEER (CONSTRUCTION)

Sub-Area Engineering Department of No. 3 (Portsmouth) Sub-Area. Salary: N.J.B. Class L, Grade 13 (£965/£1,090 per annum). N.J.B. Conditions of Service.

The duties of the post will be to carry out site supervision, installation and erection of plant, equipment and overhead lines, the laying of cables and other constructional work on all distribution systems up to and including 33 kV.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton La, Cosham, Portsmouth, and returned to him, quoting Z.1312, not later than 8 May, 1961.

The successful applicants for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. (A 475)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

West Midlands Division

ASSISTANT MAINTENANCE ENGINEER
(ELECTRICAL)

REQUIRED at Rugeley Power Station, Rugeley, Staffs. N.J.B. service conditions, superannuable appointment. Salary according to Class L, Grade 8, Scale 12, £1,350/£1,500 per annum.

Applicants should have served an apprenticeship and have technical qualifications of H.N.C. level or leading to corporate membership of a major engineering institution.

Wide practical experience of the maintenance of heavy electrical plant and switchgear is essential.

Apply, quoting vacancy No. 123/61 MD, on form AE6, available from the Station Superintendent, Rugeley Power Station, Rugeley, Staffs, to whom they should be returned by 8 May, 1961. (A 482)

YORKSHIRE ELECTRICITY BOARD

Head Office

CHIEF ENGINEER'S DEPARTMENT
DISTRIBUTION DESIGN (SUBSTATIONS)
SECOND ASSISTANT ENGINEER

DUTIES will include the design of indoor and outdoor substations operating at voltages of 33 kV and above, the preparation of specifications for substation plant and subsequent negotiations with plant manufacturers. They will also cover protective gear applications on the primary h.v. system.

Applications are invited from suitably qualified engineers having a sound general knowledge of substation plant and some experience of field construction.

Salary: N.J.B., Class BX, Grade 5 (transitional to Scale 14), £1,375/1,720 p.a.

Applications, together with the names of two referees, should be sent to the Secretary, Yorkshire Electricity Board, Wetherby Rd, Scarcroft, nr. Leeds, not later than 12 May, 1961.

No. 1 (Bradford) Sub-Area

KEIGHLEY DISTRICT
DISTRICT COMMERCIAL ENGINEER

Applicants should have had considerable experience in all aspects of a District Commercial Organisation. Candidates must have a sound knowledge of tariffs and their appropriate application, and be capable of carrying out negotiations with all classes of consumers for new and additional loads. They should have experience of load development, be fully conversant with I.E.E. Wiring Rules and with Statutory Regulations, and be capable of controlling staff. The possession of a Higher National Certificate in Electrical Engineering or its equivalent would be an advantage.

Salary: N.J.B. Class F, Grade 3 (Scale 12), £1,350 x £30—£1,500 p.a.

THIRD ASSISTANT DISTRICT ENGINEER

Applicants should have passed the Associate Membership Examination of the Institution of Electrical Engineers, or hold equivalent qualifications, and have experience in construction, operation and maintenance of high voltage systems, underground cables and overhead lines and substations, and medium low voltage networks.

Candidates should be prepared to reside within the District and undertake standby duties.

This post has been advertised before and previous applicants need only state by letter if they wish their application to be reconsidered.

Salary: N.J.B. Class F, Grade 9 (Scale 6), £890/£1,015 per annum.

Applications, together with the names of two referees, should be sent to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford 1, not later than 12 May, 1961.

No. 4 (Leeds) Sub-Area

CONSUMERS' ENGINEER (LEEDS)

Applicants should have had a sound practical training in the Electricity Supply Industry and should possess a Higher National Certificate in Electrical Engineering or an equivalent qualification. Candidates should be capable of carrying out negotiations with all types of consumers for new and additional supplies and have a sound knowledge of the various tariffs. They should have had experience of general load development, be fully conversant with the Electricity Supply and I.E.E. Regulations and be capable of controlling staff.

Salary: N.J.B. Class K, Grade 7 (Scale 12), £1,350/£1,500 p.a.

ASSISTANT CONSUMERS' ENGINEER (LEEDS)

Applicants should have had a sound practical training in the Electricity Supply Industry and should possess a Higher National Certificate in Electrical Engineering or an equivalent qualification. They should have had experience in general load development in the industrial, commercial and domestic fields, be fully conversant with Electricity Supply and I.E.E. Regulations and be capable of undertaking all forms of consumer service.

Salary: N.J.B. Class K, Grade 10 (Scale

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9), £1,115/£1,245 p.a.

Applications, together with the names of two referees, should be sent to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, nr. Leeds, not later than 12 May, 1961. (A 481)

ARABIAN GULF SHEIKDOM OF QATAR

State Electricity Department, Doha

APPLICATIONS are invited for the following posts on three- to five-year contracts in a new steam power station, the initial equipment of which is two 15,000 kW turbo-alternator sets with associated gas-fired boilers and ancillary equipments.

ASSISTANT POWER STATION SUPERINTENDENT (Scale E.1)

Qualifications: First class M.O.T. Certificate (Steam and Motor) or Higher National Certificate (Mechanical and Electrical), plus at least six years' experience in modern power station operation and maintenance practice.

ELECTRICAL MAINTENANCE ENGINEER (Scale E.2)

Qualifications: Higher National Certificate (Electrical), plus at least six years' experience in power station plant maintenance, particularly rotating machinery, transformers, control and switchgear up to 66 kV and protecting gear.

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Qualifications: First class M.O.T. Steam Certificate or equivalent with at least three years' maintenance experience with modern steam power station plant and ancillary equipment. Applicants must be prepared to carry out overhauls assisted by locally employed fitters and also to assist with maintenance of large diesel units.

SHIFT CHARGE ENGINEERS (Scale E.2)

Qualifications: Second class M.O.T. Certificate or National Certificate or equivalent with at least four years' experience in charge on shift duties in modern steam power stations and fully experienced in synchronising and switching operations **on H.T. up to 66 kV** and L.T. feeder networks.

Salaries: Scale E.1, £2,250/£2,280; Scale E.2, £1,590/£2,070. Starting point according to experience.

Age Limits: 30-45 years.

General Conditions: FREE air-conditioned accommodation furnished at high standard. FREE fuel, water and electricity. FREE air passages for applicant, wife and up to three children. FREE medical and dental attention. ANNUAL LEAVE of six days for each month of duty. INTEREST FREE car loan with generous running allowance. GRATUITY of one month's salary for each year of service. NO INCOME TAX.

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CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

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ROGERSTONE POWER STATION
RISCA ROAD, ROGERSTONE, MON
Vacancy No. 81/ET/61.

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USKMOUTH "A" POWER STATION
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STATION SHIFT CONTROL ENGINEER
USKMOUTH "A" AND "B" POWER STATIONS
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Vacancy No. 83/ET/61.

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10% shift allowance applied in all cases.

FOURTH ASSISTANT ENGINEER (CIVIL)
DIVISIONAL TRANSMISSION DEPARTMENT
BASED AT NEATH, GLAM
Vacancy No. 84/ET/61.

Salary: Schedule B, Class AX, Grade 9, Scale 9, £1,005/£1,245 per annum.

Duties will include site survey and levelling for grid substations. The supervision of site construction work including concrete foundations (and piling where necessary), reinforced concrete structures and buildings, site measurements and certification for payment.

FOURTH ASSISTANT ENGINEER (OVERHEAD TRANSMISSION LINES)
DIVISIONAL TRANSMISSION DEPARTMENT
BASED AT NEATH, GLAM
Vacancy No. 85/ET/61.

Salary: Schedule B, Class AX, Grade 9, Scale 9, £1,005/£1,245 per annum.

Duties include survey work associated with the construction of 132 kV and higher voltage transmission lines, supervision of construction of steel tower and wood pole overhead lines.

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CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

West Midlands Division

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)

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SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT (SECRETARIAL)
SURREY AREA HEADQUARTERS
DORKING

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MAIDSTONE DISTRICT

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Applications, quoting ET and naming two referees, to District Manager, Seeboard, Fairmeadow, Maidstone, by 10 May, 1961. Previous applicants for this appointment need not re-apply.

GEORGE WRAY,
Secretary.
(A 477)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Chilterns Sub-Area

SUB-AREA COMMERCIAL DEPARTMENT
THIRD ASSISTANT ENGINEER
(COMMERCIAL)
82/61.R.

Candidates should have had a good general and technical education with experience in the design, installation and selling of thermal storage heating to builders, architects, etc., together with a knowledge of tariffs. Membership of the Institution of Electrical Engineers or possession of the Higher National Certificate would be an advantage.

Salary: N.J.B. Class L, Grade 9 (£1,275/£1,410 per annum).

Apply by letter to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend St, Bedford, by 12 May, 1961.

Essex Sub-Area

NORTH ESSEX DISTRICT
ENGINEER
92/61.R.

This vacancy arises from the impending retirement of the present District Engineer.

continued in next column

continued from previous column

Candidates should have had wide experience in the planning, construction, operation and maintenance of overhead and underground distribution sytems (including substations) and should be capable of organising and supervising the engineering work of the District.

Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary: N.J.B. Class F, Grade 3 (£1,350/£1,500).

Apply by letter to J. C. Horrell, M.I.E.E., Manager, North Essex District, Eastern Electricity Board, Cressing Rd, Braintree, Essex, by 12 May, 1961.

Northmet Sub-Area

ASSISTANT ENGINEERS
(a) THIRD ASSISTANT ENGINEER
STEVENAGE DISTRICT
(Ref. 1030) 84/61.R.
(b) FOURTH ASSISTANT ENGINEER
HENDON DISTRICT
(Ref. 1054) 87/61.N.
(c) FOURTH ASSISTANT ENGINEER
HERTFORD DISTRICT
(Ref. 942) 88/61.N.
(d) FOURTH ASSISTANT ENGINEER
STEVENAGE DISTRICT
(Ref. 1055) 89/61.N.

Candidates should have had sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. distribution systems, including substations.

Salary: (a) N.J.B. Class G, Grade 9 (£965/£1,090); (b) N.J.B. Class G, Grade 11 (£825/£940) plus London Allowance; (c) and (d) N.J.B. Class G, Grade 11 (£825/£940).

Apply by letter, by 8 May, 1961 as follows:

For (a) and (d) to H. L. Sumner, Manager, Eastern Electricity Board, Walkern Rd, Stevenage.

For (b) to F. A. Moinet, M.I.E.E., Manager, Eastern Electricity Board, 137-139 Brent St, Hendon, N.W.4.

For (c) to W. H. Hatton-Ward, ASSOCIATE I.E.E., A.M.B.I.M., Manager, Eastern Electricity Board, Bridgefoot, Ware, Herts.

METER TESTING STATION
15 FRIERN BARNET LANE, N.11
GENERAL ASSISTANT ENGINEER
(Ref. 979) 90/61.N.

Candidates should have had a good general and technical education. A knowledge of the repair, testing and commissioning of meters and metering equipment for domestic and industrial supplies will be an advantage.

Salary. N.J.B. Class N, Grade 15 (£965/£1,090) plus London Allowance.

Apply by letter to the Manager, Eastern Electricity Board, Northmet Sub-Area, Northmet Hse, Southgate, London N.14, by 8 May, 1961.

EDMONTON DISTRICT
SENIOR SALES REPRESENTATIVE
(Ref. 1057) 93/61.N.

Candidates should have had practical training with experience of domestic and small commercial and industrial installations. An ability to sell appliances with advice to consumers on supply matters, tariffs and apparatus is required.

Salary: N.J.C. Grade 2 (£700/£775) plus London Allowance.

Apply by letter to C. A. Baker, B.SC.,ENG. (LOND), M.I.E.E., Manager, Eastern Electricity Board, Edmonton District, 305 Fore St, Edmonton, N.9, by 8 May, 1961.

Suffolk Sub-Area

STOWMARKET DISTRICT
THIRD ASSISTANT ENGINEER
83/61.N.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems, including substations, at voltages up to and including 33 kV.

Salary: N.J.B. Class F, Grade 9 (£890/£1,015).

Apply by letter to G. N. H. Mayes, T.D., A.M.I.E.E., Manager, Stowmarket District, Eastern Electricity Board, 25 Ipswich Rd, Stowmarket, Suffolk, by 12 May, 1961. (A 488)

THE EAST MIDLANDS ELECTRICITY BOARD

Northamptonshire Sub-Area

Re-Advertised Vacancy No. 34/61.
THIRD ASSISTANT DISTRICT ENGINEER
NORTHAMPTON DISTRICT

SALARY: N.J.B. Class G, Grade 9, £965/£1,090 per annum.

The duties of the post will be to assist in the planning, construction, operation and maintenance of underground and overhead systems up to and including 11 kV.

The successful candidate will be required to reside in or near Northampton and to undertake standby duty.

Vacancy No. 46/61.
PRINCIPAL ASSISTANT (INCOME)
NORTHAMPTONSHIRE SUB-AREA
HEADQUARTERS

Salary: N.J.C. Grade 7, £1,250 x £35—£1,355 per annum.

The successful applicant will be responsible for the three Sections dealing with:

1. Pre-Billing and Prepayment.
2. Special Billing.
3. Post-Billing.

Candidates should possess a recognised accountancy qualification and have had experience in all matters relating to consumers' accounts.

Applications for the above vacancies, giving details of age, qualifications, experience, present position and salary, should be forwarded to the Manager, Northamptonshire Sub-Area, 25 Bridge St, Northampton, so as to reach him not later than Saturday, 13 May, 1961. (A 479)

SOUTHERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER
(PLANNING AND DEVELOPMENT)

SUB-AREA Engineering Department of No. 1 (Southall) Sub-Area, located at Waterloo Rd, Uxbridge. Salary: N.J.B. Class M, Grade 10 (£1,325/£1,460 per annum, inclusive of London Allowance). N.J.B. Conditions of Service.

The duties of the post will be to assist in the planning of H.V. and L.V. networks, including system load flow and short-circuit calculations.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill La, Southall, Middlesex, and returned to him, quoting Z.1339, not later than 8 May, 1961.

FIELD ENGINEER (CONSTRUCTION)

Sub-Area Engineering Department of No. 3 (Portsmouth) Sub-Area. Salary: N.J.B. Class L, Grade 13 (£965/£1,090 per annum). N.J.B. Conditions of Service.

The duties of the post will be to carry out site supervision, installation and erection of plant, equipment and overhead lines, the laying of cables and other constructional work on all distribution systems up to and including 33 kV.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton La, Cosham, Portsmouth, and returned to him, quoting Z.1312, not later than 8 May, 1961.

The successful applicants for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. (A 475)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

West Midlands Division

ASSISTANT MAINTENANCE ENGINEER
(ELECTRICAL)

REQUIRED at Rugeley Power Station, Rugeley, Staffs. N.J.B. service conditions, superannuable appointment. Salary according to Class L, Grade 8, Scale 12, £1,350/£1,500 per annum.

Applicants should have served an apprenticeship and have technical qualifications of H.N.C. level or leading to corporate membership of a major engineering institution.

Wide practical experience of the maintenance of heavy electrical plant and switchgear is essential.

Apply, quoting vacancy No. 123/61 MD, on form AE6, available from the Station Superintendent, Rugeley Power Station, Rugeley, Staffs, to whom they should be returned by 8 May, 1961. (A 482)

LONDON TRANSFORMER PRODUCTS LTD.

require the following technical personnel for employment at their main works in Bridgend, Glam. The offices are situated in pleasant country surroundings in the vale of Glamorgan and five miles from the sea.

(1) SENIOR TRANSFORMER DESIGNER

with considerable experience of various types up to 5 MVA. Realistic initial salary together with progressive increases. A company house on advantageous terms is available to suitable applicant, preferably in age group 30-40.

(2) JUNIOR TRANSFORMER DESIGNER

with some experience of power and distribution units and with technical qualifications up to H.N.C. level. Initial salary according to experience together with progressive increases.

Application re (1) and (2) *to Chief Designer.*

(3) TRANSFORMER DRAUGHTSMEN

with experience on Distribution and Power Transformers up to 5 MVA. Salary according to age and experience. Application re (3) to Chief Draughtsman.

(A 448)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Birmingham Area:

GENERAL ASSISTANT ENGINEERS (TECHNICAL AND PLANNING SECTION) (AREA OFFICES)

The successful applicant will be required to assist with the analysis of loading conditions, design of extensions and reinforcements to the H.V. and M.V. systems, both underground and overhead, and layout and specifications of plant and equipment. Salary within the ranges £890/£1,015, £965/£1,090 or £1,040/£1,165 per annum (N.J.B. Grades N.16, 15 or 14), according to qualifications and experience. Apply, by letter, within seven days, stating age, experience, present position and salary, to Emil Braathen, Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

Central Gloucestershire Area:

FIRST ASSISTANT DISTRICT ENGINEER (GLOUCESTER)

Applicants should be good organisers and have had experience in all branches of distribution work, including operation, maintenance and construction of H.V. and L.V. cables, overhead lines, substations, etc. Technical qualifications desirable. Salary: £1,190/£1,325 per annum (N.J.B. Grade F.5). Apply, by letter, within 14 days, stating age, present salary, full particulars of experience and present position to Mr S. Raybould, Area Manager, Midlands Electricity Board, Eastern Ave, Gloucester.

F. W. CATER,
Secretary.
(A 458)

CENTRAL ELECTRICITY GENERATING BOARD
South Western Division

Vacancy Notice: ET/AV/41/61.
GENERAL ASSISTANT ENGINEER

REQUIRED at Portishead "B" Power Station.

Superannuation Scheme. Salary: N.J.B. Class K, Grade 15, Scale 4, £765/£870 per annum.

Possession of, or at present studying for, a Higher National Certificate or similar qualification, would be an advantage.

Applications on Form AE6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 8 May, 1961. (A 478)

CENTRAL ELECTRICITY GENERATING BOARD
South Eastern Division

CROYDON "B" POWER STATION
VACANCY No. 124/61.
ASSISTANT SHIFT CHARGE ENGINEER

APPLICANTS should have experience in a generating station and be conversant with the operation of P.F. boilers. Experience of labour control is essential, and applicants should preferably hold O.N.C. electrical or mechanical.

Salary: N.J.B. Class J, Grade 8, £1,359/£1,507 10s per annum, including London and shift allowances.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey, to arrive by 12 May.

(A 472)

CITY OF CARDIFF
City Surveyor's Department

APPLICATIONS are invited from suitably qualified persons for the vacant position of:

ELECTRICAL ENGINEERING ASSISTANT
APT. Grade 3/4 (£960/£1,310).

General Conditions of Appointment and further information may be obtained from the undersigned, to whom should be sent all applications, in envelopes suitably endorsed, stating age, experience, qualifications, and names and addresses of three referees.

Closing date: 6 May, 1961.

S. TAPPER-JONES,
Town Clerk.

City Hall,
Cardiff. (A 455)

G.W.B.
FURNACE DIVISION

has the following vacancies:

1. ELECTRICAL ENGINEER to deal with design and handling of electrical plant for furnace equipment. Applicants should have H.N.C. Electrical Engineering or be studying for the equivalent qualification. Engineering apprenticeship and some application experience in dealing with electrical plant essential, experience with furnace equipment desirable but not essential. Age group 21-28 preferred.
2. ELECTRICAL DRAUGHTSMAN to handle diagrams, preparation of electrical control gear and layout of plant. Good background in Drawing Office experience essential.

Apply, in confidence, giving details of experience to:

Divisional Manager,
G.W.B. Furnaces Ltd.
(Furnace Division),
Dibdale Works,
Dudley,
Worcs.

(A 456)

ADMIRALTY—NAVY WORKS DEPARTMENT ENGINEERING DRAUGHTSMEN ELECTRICAL AND MECHANICAL

Vacancies exist in Navy Works Department Drawing Offices at the following Establishments: Pinner (Middlesex), London, Chatham, Portsmouth, Portland, Devonport, Milford Haven, Liverpool and Rosyth and occur elsewhere in the United Kingdom from time to time.

The posts are non-pensionable but there will be opportunities for transfer to the Established staff.

Applicants must be competent Draughtsmen and experienced in one or more of the following types of work:

Electrical

(a) Preparation of specifications, drawings and schedules for electrical equipment. Précis of firms' tenders.
(b) Electrical installations in domestic and industrial buildings.
(c) Cable installations, switchgear, etc.
(d) Airfield lighting.
(e) Low Tension Power distribution systems and Telecommunications Wiring.

Mechanical

(a) Preparation of specifications, drawings, schedules for Mechanical Equipment. Précis of firms' tenders.
(b) District heating, including boiler installations, heating and air conditioning of domestic and specialist buildings.
(c) Layouts of engineering installations and workshop machinery.
(d) All classes of lifting appliances, pumping installations, test plants, cooking equipment, etc.

Possession of O.N.C. or similar qualification will be an advantage. Consideration will be given to successful candidates being granted assistance to obtain technical qualifications.

Salary (Men): National Rate—subject to slight variation dependent on location: starting from £603 (at age 21) to £905 (28 and over); maximum of scale—£993 p.a. (National Rate).

Opportunities occur for promotion to Leading grade—salary maximum £1,160 p.a. (National Rate).

Five-day week; annual leave 18 days, rising to 22 after ten years.

Candidates, who must be British subjects, are invited to apply in writing, giving details of qualifications and experience to Director General, Navy Works, Admiralty, Chamberlain Way, Pinner, Middlesex, quoting ref. 45/96/125.

(A 461)

UNIVERSITY OF AUCKLAND
New Zealand
SENIOR LECTURESHIP OR LECTURESHIP IN ELECTRICAL ENGINEERING

APPLICATIONS are invited for the above-mentioned post. Candidates should be University graduates in Electrical Engineering; a higher degree would be an advantage. Previous lecturing experience is not essential.

The salary scale for a Senior Lecturer is £1,750 per annum rising to £2,000 and for a Lecturer £1,250 rising to £1,700 per annum. Commencing salary within the appropriate scale will be determined according to qualifications and experience. An allowance will be made towards travelling expenses.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Sq, London W.C.1.

Applications close, in New Zealand and London, on 15 June, 1961. (A 466)

THE EAST MIDLANDS ELECTRICITY BOARD
Mansfield and North Nottinghamshire Sub-Area
VACANCY No. 44/61.
SENIOR ASSISTANT (STORES)

SALARY: N.J.C. Grade 4, £890 x £30—£1,010 per annum.

The successful applicant will be required to take charge of the Mansfield District Stores and to maintain contact with Storekeepers in other Districts within the Sub-Area.

His responsibilities will include:

1. The day-to-day operation of the Stores.
2. The discipline of Stores personnel.
3. In collaboration with the appropriate user departments, fixing stock levels and agreeing categorisation of materials.
4. The security and safe custody of stocks (including scrap materials).
5. Advising the Sub-Area Accountant on the standardisation of storekeeping methods and the centralisation of stocks.

Candidates should have a knowledge of the types of materials, plant and equipment, etc., used by the Board and be conversant with storekeeping and stock control practices.

Applications, giving details of age, qualifications, experience, present position and salary, should be forwarded to The Manager, Mansfield and North Nottinghamshire Sub-Area, Lime Tree Pl, Mansfield, so as to reach him within 14 days of the date of this advertisement. (A 442)

ENGLISH ELECTRIC

INDUSTRIAL APPLICATION ENGINEERS

Vacancies exist in our Application Divisions for engineers interested in the problems of applying electrical equipment to industrial processes—particularly electrical drive systems. The work which these vacancies cover include the determination of electrical equipment performance which will best meet the requirements of a process, the design of equipment layout and installation, and the design of high voltage and low voltage distribution systems.

The work is of particular interest to young qualified engineers who enjoy meeting people and selling technical ideas, while at the same time doing a job requiring high technical ability. Travel to various parts of the United Kingdom and overseas is often necessary.

Minimum qualifications required are Graduate Membership I.E.E. or I.Mech.E.

Please write giving details of qualifications and experience to Dept. G.P.S., English Electric House, Strand, London W.C.2, quoting reference ET 1296 Q.

(A 449)

SALES ENGINEER

Bruce Peebles require a Sales Engineer of H.N.C. standard for their Transformer Contracts Section. Five-day week, staff pension scheme. Housing assistance given if necessary.

Apply giving details of experience and present salary to Divisional Director (Transformers), Bruce Peebles and Co. Ltd., East Pilton, Edinburgh 5, quoting Ref. SE/ET.

(A 467)

THE NORTH WESTERN ELECTRICITY BOARD
FOURTH ASSSISTANT ENGINEER
SUBSTATIONS SECTION
SUB-AREA ENGINEERING DEPARTMENT
MANCHESTER

THE duties will include assisting with the installation and maintenance of transformers and switchgear for all voltages up to 33 kV, mercury arc rectifiers, rotary plant and ancillary equipment of all types. Manufacturing experience, including "on-site" erection, will be an advantage.

Preference will be given to applicants who hold the H.N.C. in Electrical Engineering.

Salary Scale: £1,040/£1,165 p.a. Grade M.13. N.J.B. Conditions.

Applications on forms to be obtained from the Manager (Staff Vacancy), No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, and returned to him by 8 May, 1961.

THIRD ASSISTANT ENGINEER
(OPERATION AND MAINTENANCE)
SUB-AREA ENGINEERING DEPARTMENT
PRESTON

Applicants should have had a wide experience in the construction, operation and maintenance of large industrial and rural networks, including overhead lines and underground cables at voltages up to 33 kV, and in high voltage testing and fault localising.

Preference will be given to applicants who hold the H.N.C. in Electrical Engineering.

Salary Scale: £1,190/£1,325 p.a. Grade L.10. N.J.B Conditions.

Applications on forms to be obtained from the Manager, No. 4 Sub-Area, The North Western Electricity Board, 40-41 Lune St, Preston, and returned to him by 8 May, 1961. (A 444)

AEI

Associated Electrical Industries Limited
Transformer Division

SALES ENGINEERS

There are several vacancies for sales and contracts engineers at Wythenshawe. The preferred technical qualifications would be a recognised engineering apprenticeship with at least H.N.C.

The posts call for a mature personality, common sense outlook and the ability to carry a job through to its final conclusion. A good command of English would be an added advantage.

The works are situated at Wythenshawe on the south side of Manchester in attractive surroundings. Good facilities are available and these are staff positions qualifying for the Company's pension scheme.

Please write giving brief details of career to:

Staff Manager (019),
Associated Electrical Industries (Manchester) Ltd.,
Trafford Park,
Manchester 17.

(A 460)

CENTRAL ELECTRICITY GENERATING BOARD
Midlands Division
GENERAL ASSISTANT ENGINEER

REQUIRED at Nechells "A" and "B" Power Stations, Birmingham, for generation operation duties. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K.15, £765/£870 per annum. An allowance of £90 is payable when engaged on shift duties.

Applicants should have received a sound technical training and should preferably have some industrial engineering experience and have appropriate technical qualifications.

Apply, quoting vacancy number 114/61MD on form AE6, available from the Station Superintendent, Nechells Power Station, off Aston Church Rd, Nechells, Birmingham 7, by 8 May, 1961. (A 457)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Lanarkshire Area

APPOINTMENT OF SECOND ASSISTANT DISTRICT ENGINEER COATBRIDGE DISTRICT

APPLICATIONS are invited for the above appointment. Applicants should have had sound engineering and technical training, with qualifications leading to corporate membership of the Institution of Electrical Engineers. They should have had experience with the maintenance and operation of H.V. and L.V. overhead and underground networks, and substations on a large distribution system. They should also be conversant with load flow diagrams, voltage drop and short-circuit calculations, and should have had experience with H.V. fault location.

The salary and conditions of service will be in accordance with the National Joint Board Agreement and the post will be superannuable. It is a condition of this appointment that the successful candidate take standby duty in accordance with the above Agreement, and reside within a reasonable distance of the District Offices at Coatbridge.

The present classification and grading is J.7 (Scale 11), present salary £1,275/£1,410.

Application forms which may be obtained from the Area Manager, Montrose Cres, Hamilton, should be returned not later than Friday, 5 May, 1961. (A 445)

CITY OF CARDIFF EDUCATION COMMITTEE

Llandaff Technical College

Principal:

J. Cotterell, M.I.E.E., A.I.MECH.E., A.M.I.PROD.E.

DEPARTMENT OF ELECTRICAL ENGINEERING

APPLICATIONS are invited for the post of

LECTURER IN THE ELECTRICAL ENGINEERING DEPARTMENT

to commence on 1 Sept., 1961. The Department provides Sandwich, Block Release and Part-time Day Courses for O.N.C., City and Guilds Technicians, Installation, Radio and Electronic Servicing. The successful candidate will be required to teach the electrical engineering subjects in these courses and in particular will be responsible for the organisation and development of the Electrical Technicians and Electronic Servicing Courses.

Salary in accordance with Burnham Technical Scale for Lecturers: £1,370 x £35(4), plus £40—£1,550.

Further particulars and application forms can be obtained from the undersigned and should be returned within 14 days of the appearance of this advertisement.

ROBERT E. PRESSWOOD,
Director of Education.

City Hall,
Cardiff. (A 443)

AIR MINISTRY

ENGINEERING DESIGNER DRAUGHTSMEN REQUIRED IN LONDON

SALARY (inner London scale) Grade III, £658/£1,048 (£866 at age 25)—starting salary depends on age, quals. and exp.

Electrical Engineering Designer Draughtsmen experienced in preparation of schemes for illumination and electrical equipment of buildings or schemes for H.V. and M.V. electrical distribution (Grade III).

Candidates should have served a recognised apprenticeship or have had equiv. training and also adequate practical exp. Possession of recognised technical qualn. an advantage—financial assistance and time off may be allowed for recognised courses of study for technical quals. Five-day week with 18 days' paid leave p.a. initially. Promotion and pension prospects. Some overseas tours with special allowances in addition to salary.

Applicants, who must be natural born British subjects, should write (quoting King's Cross O/N 803) to Air Ministry, W.G.d, Lacon Hse, Theobalds Rd, London W.C.1, or to any Employment Exchange, giving age, details of training, quals. and full particulars of former posts held. Candidates selected will normally be interviewed in London and certain expenses reimbursed. Only candidates selected for interview will be notified. (A 349)

J. & P. **SWITCHGEAR DEPT.**

SENIOR TECHNICAL SALES ENGINEER

Johnson and Phillips Ltd. have an immediate vacancy in their Switchgear Department for a senior Technical Sales Engineer, who would be based on their Works. Duties involve preparation of Tenders and handling of Contracts for Switchgear up to 33 kV. This is an interesting post with considerable scope and good prospects. Applications stating age, training and experience to:

EMPLOYMENT MANAGER,
JOHNSON AND PHILLIPS LTD.,
VICTORIA WAY, CHARLTON, S.E.7.

Local initial interviews arranged if desired. (A 465)

BRUSH

(A member of the Hawker Siddeley Group—Industrial Division)

DRAUGHTSMEN

Transformers
Switchgear
Rotating Electrical Machines
Motor Control Gear
Electric and Diesel Electric Locomotives
(Mechanical, Control Gear & Electrical Machines)
General Engineering

If you are a qualified Draughtsman and interested in one of the above vacancies, please apply to *Mr. A. Garner, Brush Electrical Engineering Company Limited, Loughborough, Leicestershire,* quoting reference: PL.9936 and giving brief details of your qualifications and experience.

ALL APPLICATIONS WILL BE TREATED IN THE STRICTEST CONFIDENCE.

The Company is situated some 15 miles from Leicester, Nottingham and Derby on the outskirts of a small town amid the pleasant Leicestershire countryside and away from the smoky industrial environment. Schooling facilities are good for all grades of education, including advanced studies at Technical Colleges and Universities in the district. In appropriate cases assistance with housing and removal expenses can be considered. (A 416)

'ENGLISH ELECTRIC'

WHETSTONE. Nr. LEICESTER

offers opportunities to

DESIGNERS & DRAUGHTSMEN

(Electrical and Mechanical)

in the following fields:

(1) General Mechanical Engineering.
(2) Plant layout for new project and contract work in connection with conventional power station plant.
(3) Cable installation work on machinery and equipment and automatic control circuits.
(4) Lighting and power system design.
(5) Preparation of electrical diagrams.

The appointments are permanent and pensionable and the Company offers modern working conditions and welfare facilities.

Enquiries giving details of age, experience, qualifications and current salary (which will be treated in strictest confidence) should be addressed to the Technical Staff Officer, Dept. G.P.S., English Electric House, Strand, W.C.2, quoting reference ET1899V. (A 450)

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

OPERATION AND MAINTENANCE STAFF

The engineering organisation of the Rutherford High Energy Laboratory is being expanded and technical staff are required to work in a group concerned with the operation and maintenance of a large Proton Synchrotron which will be used in the Laboratory's research programme.

Applicants with a sound basic engineering training and possessing good experience in the control and/or maintenance of large power plant are required to undertake these duties as applied to a 120 MVA power plant comprising a large motor alternator set feeding transformers and an associated converter installation. For the maintenance posts, experience of large machine erection and alignment is required.

These posts may involve unusual hours of work and/or shift working.

Possession of an appropriate National Certificate in Engineering together with a general knowledge of converter or rectifier installations, control and protection systems and industrial electronics would be an advantage. Several posts are available, the salary being in the range £1,060/£1,490, according to age and experience.

The Rutherford High Energy Laboratory is a centre for research into fundamental nuclear science and is being constructed adjacent to the Atomic Energy Establishment at Harwell. There is a contributory superannuation scheme and assistance is given with housing.

If you are interested in joining this new organisation, then please send a POST-CARD for an application form to the Personnel Officer, the Rutherford High Energy Laboratory, Harwell, Berkshire, quoting reference VN 46/49. (A 446)

LAING

MECHANICAL AND ELECTRICAL SERVICES

JOHN LAING AND SON LIMITED requires ENGINEERS and DRAUGHTSMEN for design, specification and Site Supervision of Installations in major Industrial and Commercial Developments.

Experience and training desirable in one or more of the following fields:

Electrical Installations.
Heating, Ventilating and Air Conditioning.
Industrial Processes.

Appointments are available for both qualified Engineers and unqualified assistants.

These are interesting and progressive posts offering opportunities for further study and experience.

The Company operates a Pension Scheme, and offers good conditions of employment.

Applications, giving brief details, should be sent to Group Personnel Manager (ME7), John Laing and Son Limited, London N.W.7. (A 484)

CENTRAL ELECTRICITY GENERATING BOARD
North Eastern and Yorkshire Region

DEPUTY POWER STATION SUPERINTENDENT
DARLINGTON POWER STATION

APPLICATIONS are invited for the appointment of Deputy Superintendent at Darlington Power Station.

Applicants should have had a wide experience in the operation and maintenance of generating plant and have also held positions of responsibility involving the control of technical engineering and administrative staff.

The successful applicant will be expected to reside within reasonable distance of the power station.

It is desirable that applicants should possess qualifications admitting to corporate membership of the Institution of Electrical Engineers and/or Institution of Mechanical Engineers.

The salary for the appointment will be in accordance with the National Joint Board Agreement, Schedule A, Grade 3, Class F (£1,350/£1,500 per annum), and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 12 May, 1961. (A 453)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT SECTION ENGINEER

REQUIRED at Llangefni. Salary within range £825/£940 per annum (N.J.B. E/9, Scale 5).

Applicants should preferably have had experience in the construction, operation and maintenance of overhead and underground high and medium voltage networks, with their associated substations and equipment.

Appointment subject to medical examination. Pension Scheme.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity Hse, Rhostyllen, nr. Wrexham. Closing date: 12 May, 1961. (A 480)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified engineers for the following appointments which are subject to the conditions of the National Joint Board.

Wear Sub-Area

SECOND ASSISTANT ENGINEER
SUB-AREA COMMERCIAL OFFICER'S STAFF
INDUSTRIAL SECTION
SUB-AREA HEADQUARTERS, SUNDERLAND

Applicants should have a sound knowledge of the general uses of electric power and heat in Industry and a wide experience of negotiations with all types of industrial consumers.

Salary: Schedule A, Class L, Grade 7, £1,440/£1,610 per annum.

York Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
SCARBOROUGH DISTRICT

Applicants should have experience of high and low voltage, urban and rural, overhead and underground distribution systems.

Salary: Schedule A, Class E, Grade 7, £965/£1,090 per annum.

THIRD ASSISTANT ENGINEER
SUB-AREA ENGINEER'S STAFF
CONSTRUCTION SECTION
SUB-AREA HEADQUARTERS, YORK

Applicants will be required to assist in all aspects of the construction of h.v. and l.v., overhead and underground distribution networks and substations up to and including 66 kV.

Salary: Schedule A, Class H, Grade 10, £965/£1,090 per annum.

Applications stating age, qualifications and experience to be received by Assistant Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle upon Tyne 1, within ten days of the appearance of this advertisement. (A474)

EASTERN ELECTRICITY BOARD
Essex Sub-Area
TWO FOURTH ASSSISTANT ENGINEERS (CONTROL)
SUB-AREA HEADQUARTERS
Ref.: 91/61/N/R.

CANDIDATES should have had a sound technical training and experience in the construction, operation and maintenance of overhead and underground distribution systems. A knowledge of system protection is desirable.

Salary: N.J.B. Class L, Grade 13, £965/£1,090, plus a Shift Allowance of 10%, plus London Allowance.

Subject to formal confirmation the Sub-Area will be reclassified from 1 April, 1961, in which case the salary for this appointment will be N.J.B. Class M, Grade 13 (£1,040/£1,165, plus Shift Allowance of 10%, plus London Allowance).

Apply by letter to C. C. Brazier, A.M.I.E.E., Engineer, Essex Sub-Area, Eastern Electricity Board, Millfield, Bentley, nr. Brentwood, Essex, by 12 May, 1961. (A 490)

CENTRAL ELECTRICITY GENERATING BOARD
North Eastern and Yorkshire Region
RESEARCH AND DEVELOPMENT DEPARTMENT CHEMIST

APPLICATIONS are invited for the appointment of a Chemist in the Service Section Laboratory of the Regional Research and Development Department of the North Eastern and Yorkshire Region with headquarters at Leeds.

The Service Section is concerned with trouble shooting and short-term research projects directly associated with problems occurring in power station operation.

Candidates for the post must have an honours degree and/or A.R.I.C. with a wide experience of power station operation.

The salary for the appointment will be on a scale within the range of £1,350/£1,720 per annum.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern and Yorkshire Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 12 May, 1961. (A 454)

CENTRAL ELECTRICITY GENERATING BOARD
Midlands Project Group
Re-Advertisement.
THIRD ASSISTANT ENGINEER (SITE PROGRESS)

APPLICATIONS are invited for the appointment of Third Assistant Engineer (Site Progress) at Aberthaw Power Station.

Candidates should preferably possess a Higher National Certificate in either mechanical or electrical engineering and have served a recognised engineering apprenticeship. Experience on the construction of heavy plant as installed in modern power stations either in a manufacturer's works or on site is essential and a knowledge of the civil engineering work involved would be an advantage.

The selected candidate will be required to maintain up to date charts on the progress of the works on site in accordance with previously agreed programmes and to assist the Resident Engineer in anticipating any divergence from these programmes. Ability to co-ordinate with Regional P.I.T. Officers will be required.

The salary will be within Grade 7, Scale 13 (£1,285/£1,610 per annum) of the National Joint Board Agreement.

Applications should be made on standard form AE6, available from the Administrative Officer, Midlands Project Group, P.O. Box 314, Birmingham 30, and should be returned to him not later than 15 May, 1961.

Envelopes should be marked "Confidential —Staff Vacancy No. MPG.29/61." (A 476)

LONDON ELECTRICITY BOARD
ASSISTANT DISTRIBUTION ENGINEER

APPLICATIONS are invited for the above position in the Board's Central District at Falcon Hse, Aldersgate St, E.C.1.

Applicants should have a sound technical education to the standard of the Higher National Certificate and possess practical experience in all branches of engineering work associated with the organisation of a District distribution department.

The post is graded under Schedule A of the National Joint Board Agreement as Class J, Grade 11—£1,015 per annum rising to £1,140 per annum, inclusive of London Allowance.

Applications stating age, qualifications and experience should be sent to the Manager at the above address within 14 days of the publication date of this notice. Please quote Ref. PER/V/3238/T. (A 462)

ASSISTANT ELECTRICAL ENGINEERS with at least H.N.C. and 2/3 years' experience of E.H.V. Transmission Work required by Consulting Engineers in their Contracts and Design Department, Weybridge. Applications stating age, qualifications, experience and salary required to Kennedy and Donkin, 12 Caxton St, London S.W.1, quoting Ref. RWMc. (A 463)

ASSISTANT ENGINEER required by Consulting Engineers in their Head Office. Experience required in design and Contract work of tower and wood pole lines. Applications stating age, qualifications, experience and salary required to Kennedy and Donkin, 12 Caxton St, London S.W.1, quoting ref.: JGW/HSJ. (A 432)

ELECTRICAL FITTER WIREMEN required for all types of Control Cubicles. Telecommunication work an advantage.—Apply Troughton and Young (Manfs.) Ltd., 18 Beddington Farm Rd, Purley Way, Croydon. (A 464)

HARTLEY ELECTROMOTIVES LTD., SHREWSBURY, require services of ELECTRICAL ESTIMATOR, SUPERVISING ELECTRICAL ENGINEER or ELECTRICIAN willing to train for this progressive position. Good salary dependent on experience, staff privileges, modern office with ideal working conditions. Housing assistance if required. Apply: General Manager, Wiring Systems Division. (A 447)

PRODUCTION FOREMAN required, with view to taking charge of 28 staff. Must be fully conversant with all aspects of armature, stator and coil winding, etc. Preference given to age group 28-45 years of age. Write giving details of experience, age and wage required to Box No. 8275, Electrical Times. (A 468)

SOUTH WALES SWITCHGEAR LTD. have vacancy for CHIEF INSULATION ENGINEER at the Blackwood Factory in Monmouthshire. Applications are invited from engineers having appropriate experience and academic qualifications. Please forward applications which will be treated in confidence, to the Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. (A 485)

TEMPORARY CLERK OF WORKS (Electrical) required in connection with Council's extensive housing programme.

Present salary: £16 2s 9d per week. Superannuable post.

Applicants should have served an indentured apprenticeship in the Electrical Contracting Industry and should have a good knowledge of all types of installations and I.E.E. Regulations. Experience in a similar position and knowledge of underfloor heating systems an advantage.

Applications on forms obtainable from the Borough Engineer and Surveyor, Civic Centre, Southampton, returnable by Wednesday, 10 May, 1961. (A 473)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

TECHNICAL MANAGER required for West London electrical equipment manufacturing company. Experienced knowledge of circuit-breakers and control gear required, with awareness of the requirements of flameproof equipment. Applications are invited from qualified electrical engineers for this senior appointment, with age not exceeding 45 years. The appointment is pensionable and applicants are requested to submit full details of technical qualifications, experience and training, etc., to Managing Director c/o Box No. 8251, Electrical Times. (A 299)

TRANSFORMER DEVELOPMENT ENGINEER to be responsible for impulse testing and other interesting development work in an expanding organisation.

Good salary and prospects for suitable applicant.

Reply in confidence, stating age, experience and qualifications.

Box No. 8259, Electrical Times. (A 354)

WANTED

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 17 Brady St, Bethnal Green, E.1. (A 1)

WORK WANTED

INSPECTION AND SPECIFICATION for elec. work; free-lance.—"Beaumont," 334-6 King St, London, W.6. (A 124)

PATENTS

THE proprietor of British Patent No. 722,315, entitled "Improvement in apparatus for starting and operating gaseous discharge devices," offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern and Carlberg, 140 So. Dearborn St, Chicago 3, Illinois, U.S.A. (A 418)

THE proprietor of British Patent Numbers 790872 and 791172, entitled "Closure for Mixing Vessels" and "Speed Control Device for Electrically Driven Machines," respectively, offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern and Carlberg, 140 South Dearborn St, Chicago 3, Illinois, U.S.A. (A 459)

AGENCIES

ANNFIELD PRODUCTS (LONDON) LTD., sole distributors of Anhold steel wood screws, require AGENTS on commission basis only for North East, North West and Central England.

First-class connection with wholesale electrical distributors.

Write, giving full particulars, to General Manager, 26 Gilbert St, London W.1. (A 390)

MARKETING ORGANISATION with assembly workshops, warehousing and sales offices in Midlands, London and Scotland, expanding and able to consider limited number of new lines, either industrial or domestic electrical, as Sole Agents.—Box No. 8277, Electrical Times. (A 469)

FOR SALE

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, Switchgear, Exhaust Fans, Hoists, Reduction Gears, new or reconditioned units.—CHI 5105, 67 Rothschild Rd, W.4. (A 2)

Classified Advertisements continued on page 46

RADIOVISOR
EST. 1927

* P.E control

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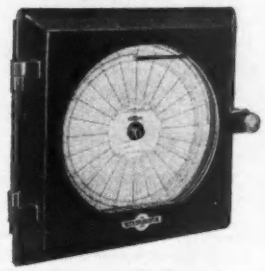
Photo-electric control helps *you* speed production, increase efficiency, cut costs.

EVENT RECORDER

LEVEL CONTROL

TURBIDITY CONTROL



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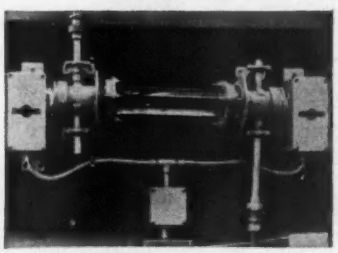
A permanent record of 'ON' 'OFF' time associated with any process or operation. Idle machine time, duration, over-load periods, etc, are recorded on a 24-hour circular chart revolving at 1" per hour.

Electronic Level Control
Radiovisor manufacture many different types of electronic level control so that from their range a unit will be found suitable for any material or liquid.



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For keeping a constant check on the clarity or turbidity of liquids in mineral water factories, breweries, chemical process plants and kindred industries.

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MAKERS OF THE MOST COMPREHENSIVE RANGE OF PHOTO-ELECTRIC CONTROLS IN THE WORLD

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RADIOVISOR PARENT LIMITED, Stanhope Works, High Path, London, S.W.19
Telephone: CHErrywood 3351 Telegrams: Radivisor, London, S.W.19

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ELECTRIC MOTORS, D.C. and A.C. Motor Generator Sets, Alternators and Dynamos, Diesel Sets, Circuit-breakers, Switchboards, reconditioned and guaranteed. Very large stocks held.—Britannia Manufacturing Co. Ltd., Britannia Walk, N.1. CLErkenwell 5512/3/4. Stores at Chobham, Surrey. (A 5)

FLUORESCENT FITTINGS, Shells and Chokes to BS 2818 (Licence No. 3237) Coil Winding, all sheet metal work.—D. E. Cowling & Sons Ltd., Romside Trading Estate, North St, Romford 47282. (A 9)

HOUSE-SERVICE METERS, all types can be obtained by return from Selectrics, Dept. E.T., Meter Hse, Factory Row, Castle Circus, Torquay. Phone 7218. (A 6)

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The "PERMANENT-WAY" to Earth. (A 451)

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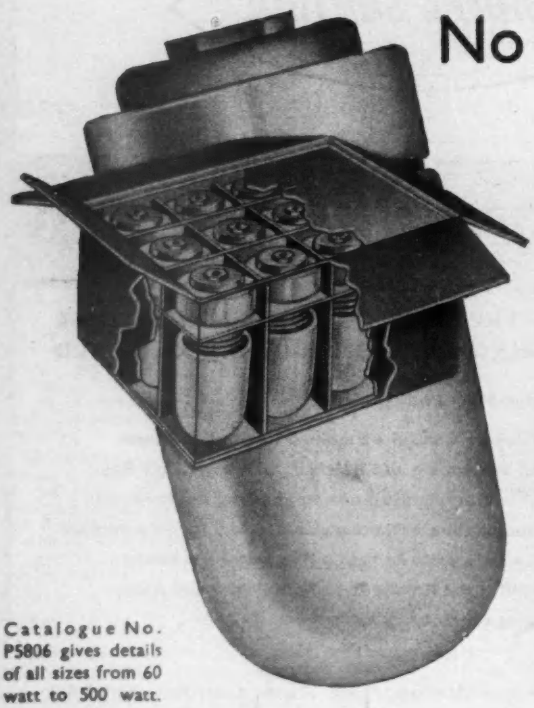

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No CASE for complaint

With R.E.A.L. Watertight Fittings supplied by the dozen in this rail-certified container, customers can be certain that they'll arrive in perfect condition, with no lost rubber rings or lampholders . . . no straw-covered glass to clean . . . no breakages. Just a part of the service—R.E.A.L. service!

REAL

Watertight Fittings

Patent No. 568702

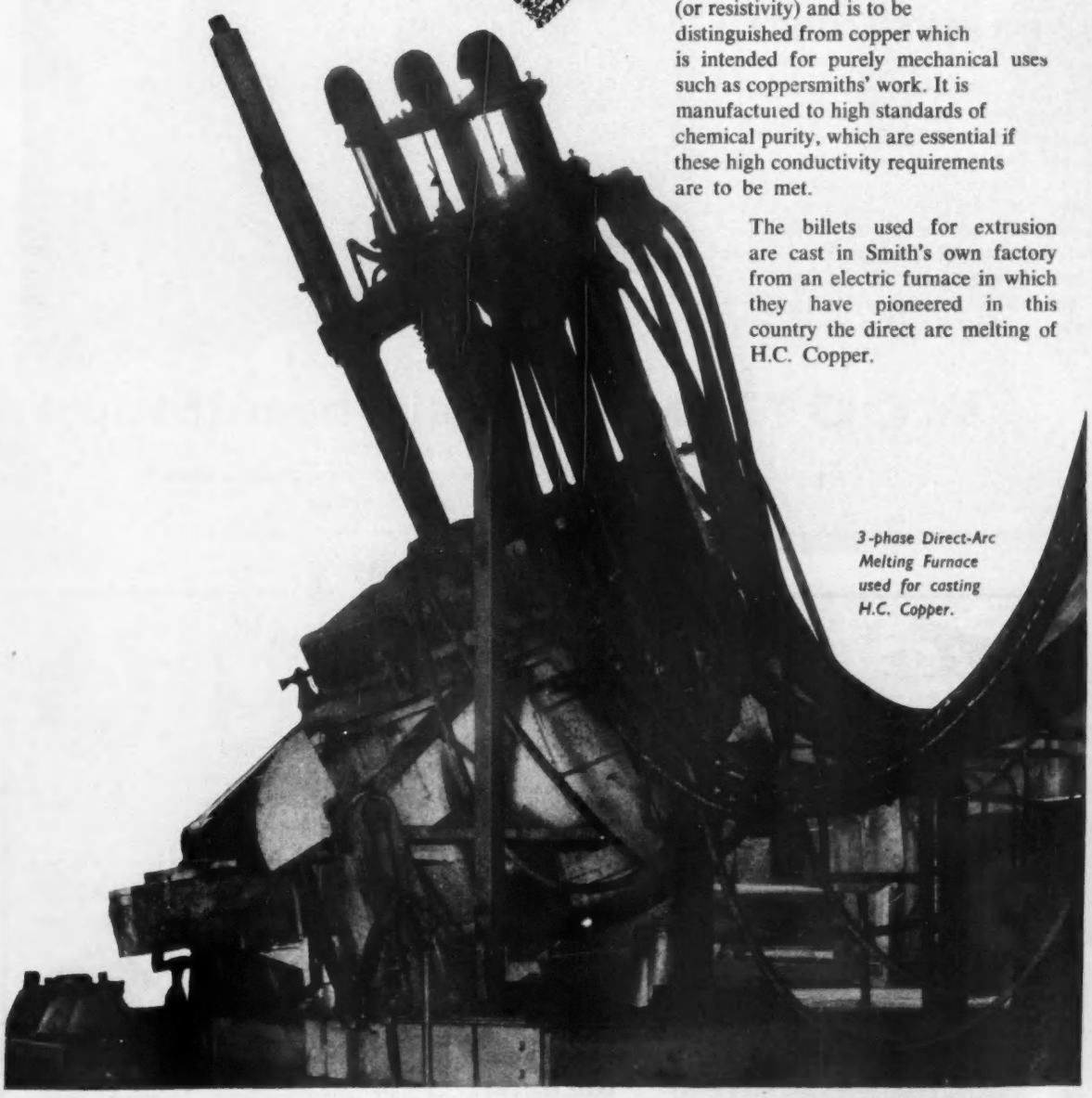
PERFECT PROTECTION IN THE PERFECT PACK

R.E.A.L. *is the registered trade mark of* ROWLANDS ELECTRICAL ACCESSORIES LTD., R.E.A.L. Works, Birmingham, 18

high conductivity copper

'High Conductivity Copper' is copper which complies with certain requirements of electrical conductivity (or resistivity) and is to be distinguished from copper which is intended for purely mechanical uses such as coppersmiths' work. It is manufactured to high standards of chemical purity, which are essential if these high conductivity requirements are to be met.

The billets used for extrusion are cast in Smith's own factory from an electric furnace in which they have pioneered in this country the direct arc melting of H.C. Copper.



3-phase Direct-Arc Melting Furnace used for casting H.C. Copper.

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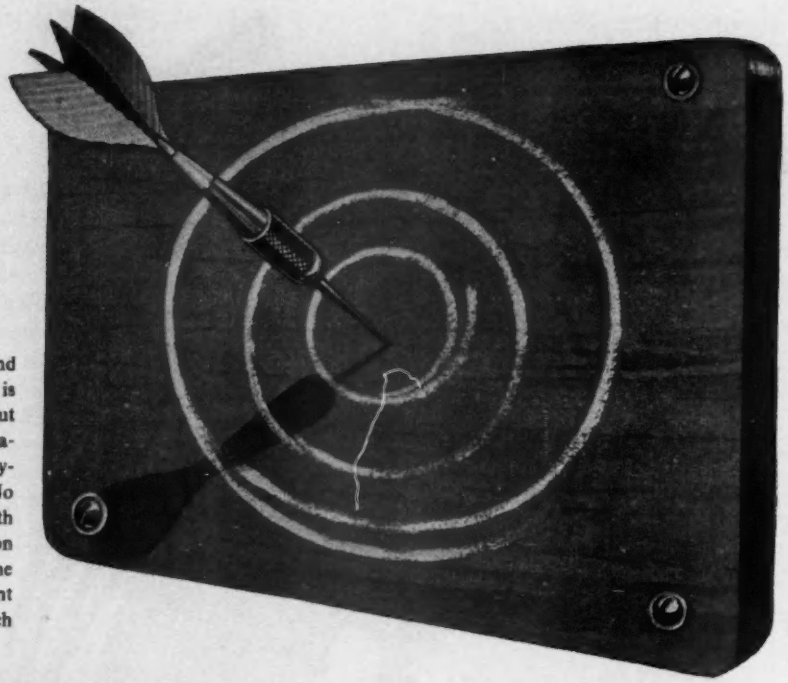
Wootton meter boards score every time!



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One of four 120 MVA 275/132 kV auto-transformers erected at the Central Electricity Generating Board Super-Grid sub-station, Northfleet West, Kent. (Each unit is equipped with FULLER 132 kV fully insulated high-speed resistor on-load tap changer.)

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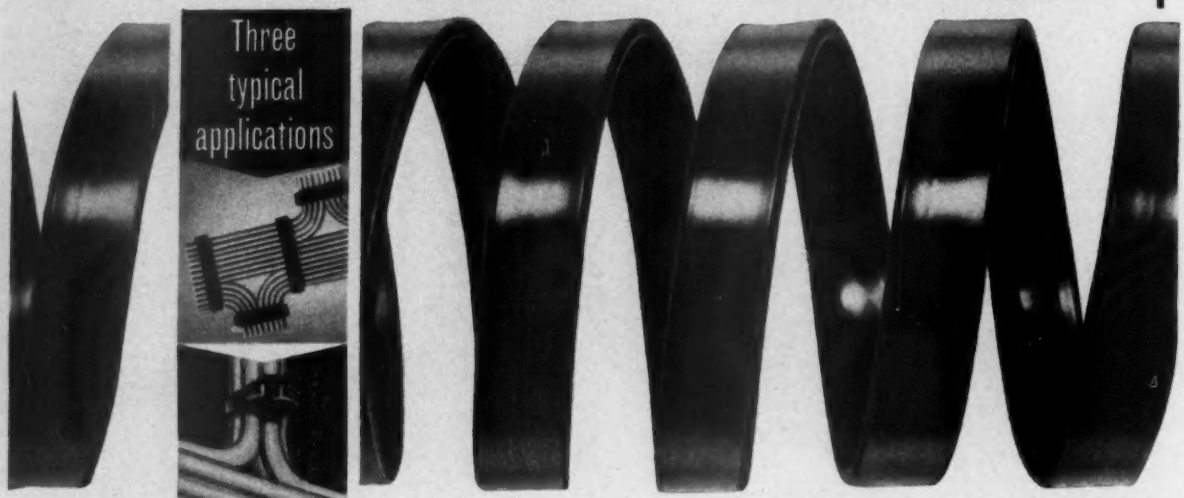

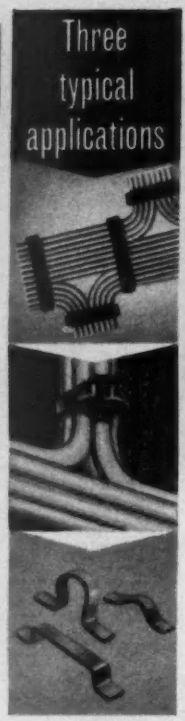

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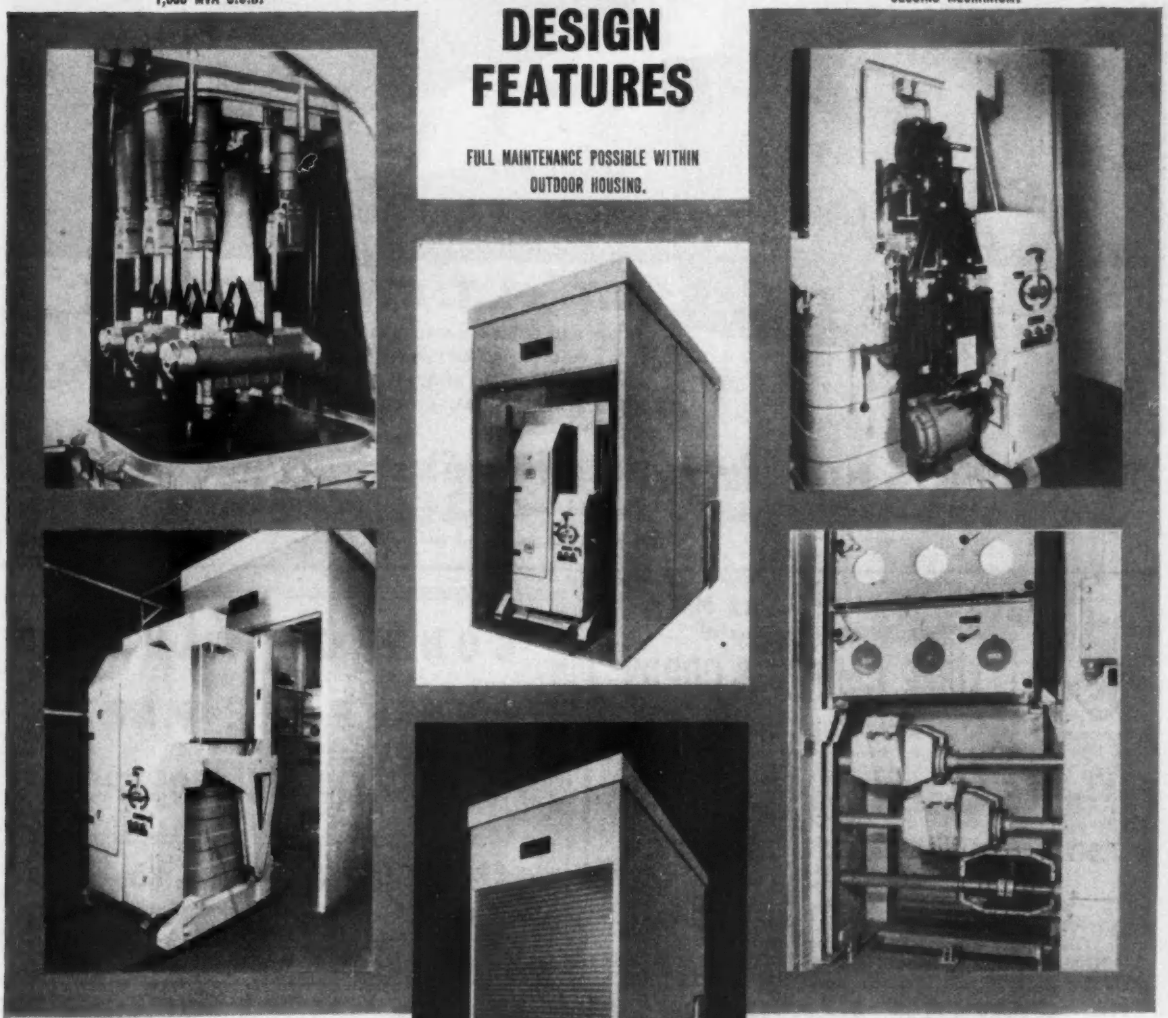

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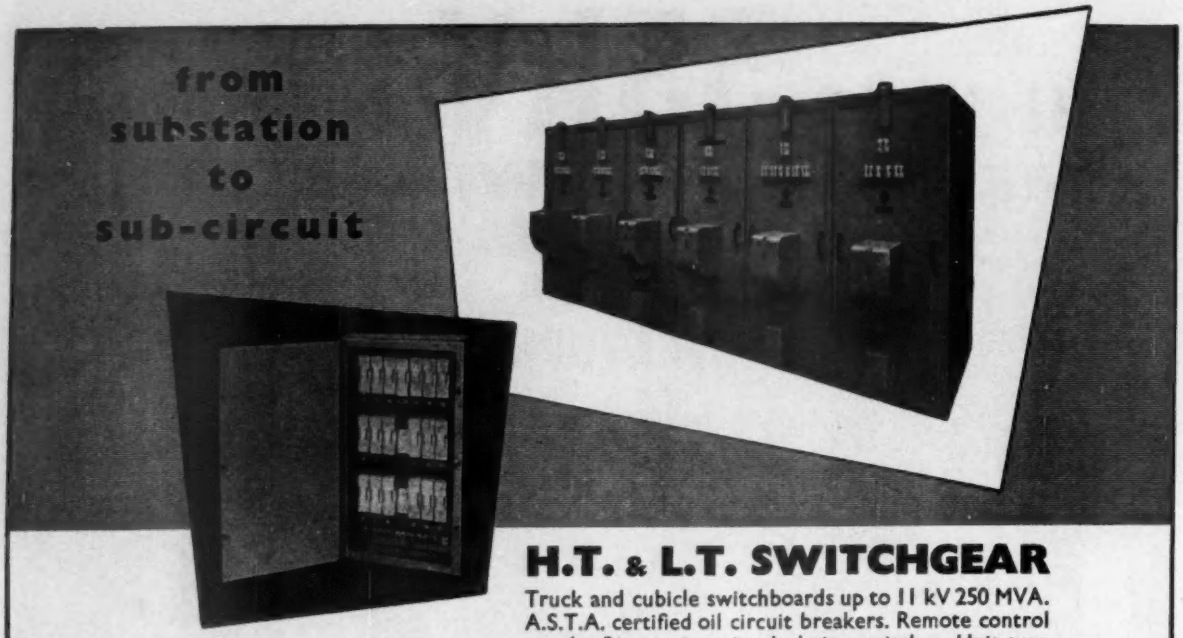

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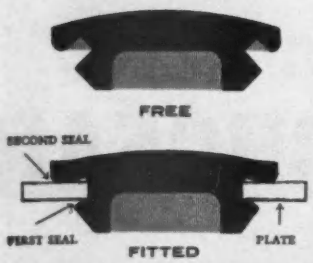

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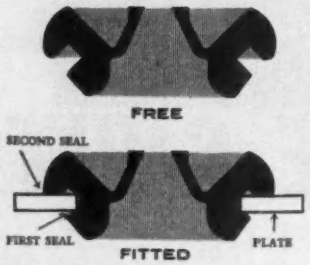
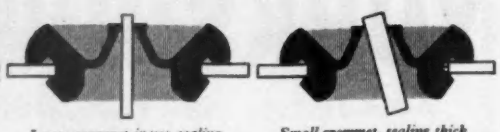


This grommet provides a thoroughly efficient seal. Around the panel hole the first seal is effected while a good, tight *second* seal around the top periphery is set up by tension. In the grommets designed for cable entry the internal seal is applied within the conical section. All grommets can be fitted to various panel thicknesses—thus reducing the range.



Large grommet in use, sealing a thin control rod

Small grommet, sealing thick cable at angle

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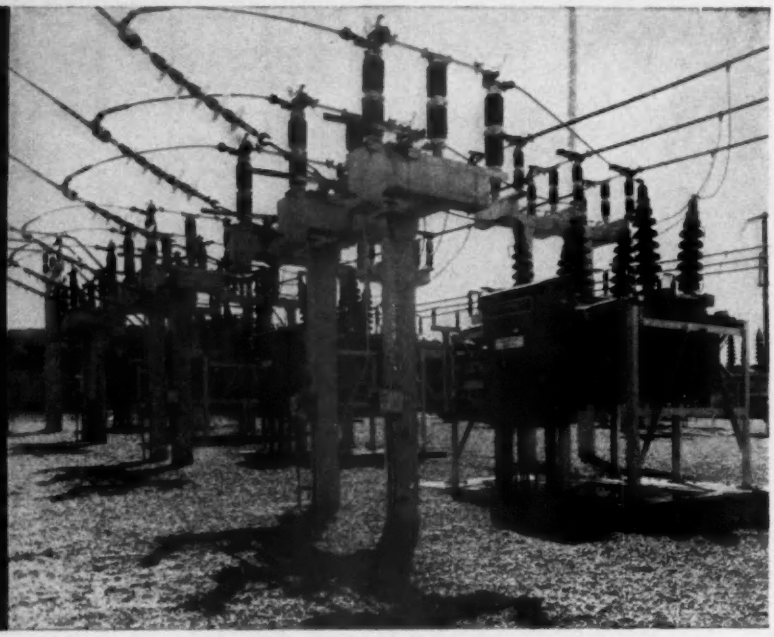

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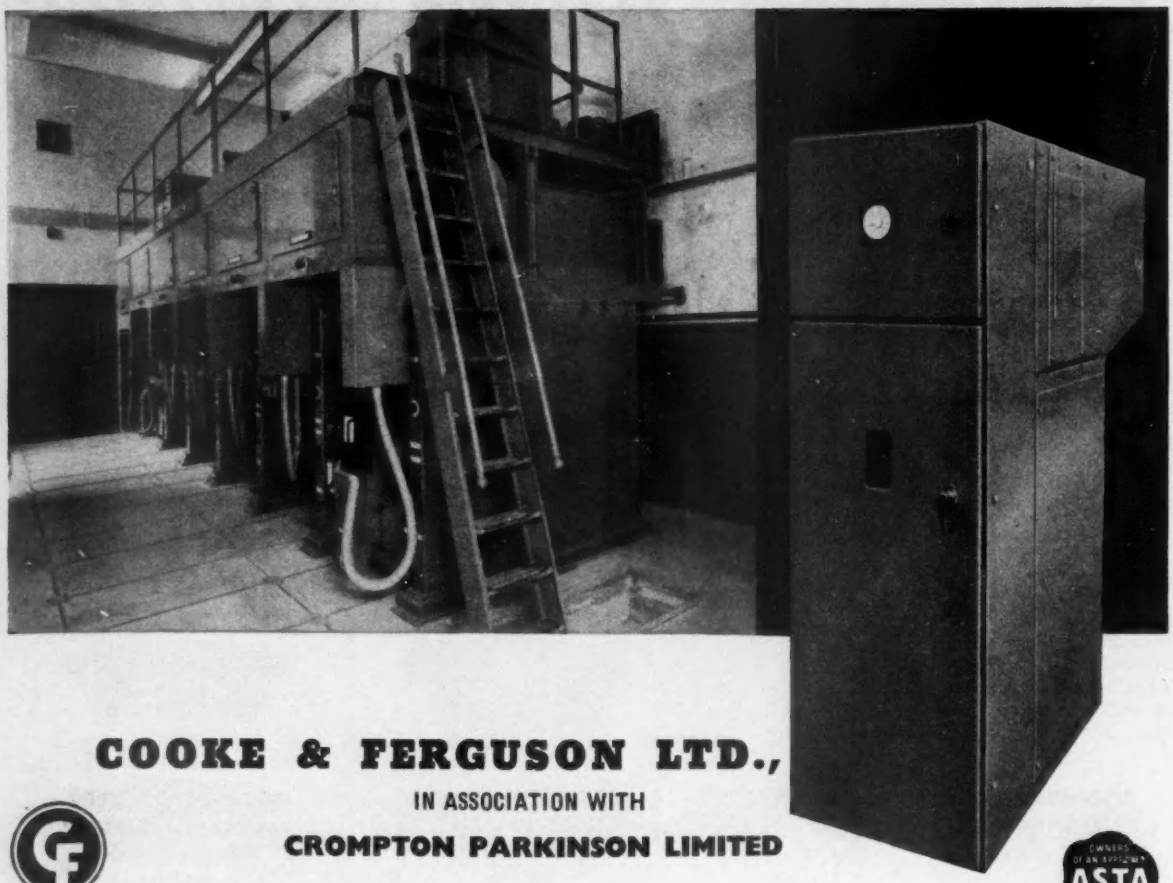

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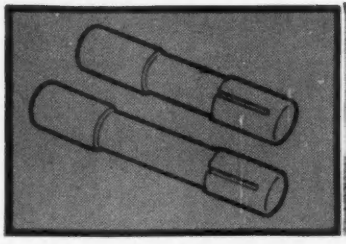

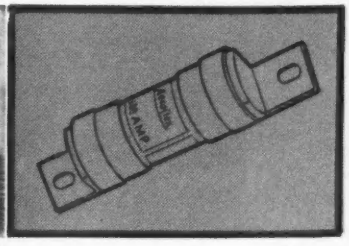

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